United States
Department of
Agriculture

Forest Service

Tongass
National
Forest
R10-MB-194

October 1992

Central Prince of Wales

DRAFT ENVIRONMENTAL IMPACT STATEMENT

Ketchikan Pulp Company Long-Term Timber Sale Contract Volume I

How This EIS is Organized

Chapter One

Purpose and Need

Chapter 1 introduces the "purpose and need" for which the Forest Service is proposing action, the public issues surrounding it, and other considerations.

Chapter Two

Alternatives

Chapter 2 presents and compares the alternatives including the no-action. Information is discussed on the environmental impacts of each alternative and how they would be implemented with measures to protect the environment.

Chapter Three

Affected Environment and Effects of the Alternatives

Chapter 3 combines a description of the affected environment with the description of how that condition could be changed or affected by the alternatives under consideration (also known as the "environmental consequences").

Chapter Four

Preparers
Distribution
Cited Literature
Glossary, Index

This chapter identifies the List of Preparers, Distribution List, Cited Literature, Glossary and Index.

Appendices

The appendices provide additional documentation to the environmental analysis. Further information is included in the Planning Record.

Acknowledgements

Front cover: By Cindy Ross Barber, 1992. The cover design illustrates the range of interconnected issues addressed in this EIS.

Photographs: Courtesy of Thorne Bay Ranger District.

United States Department of Agriculture
Forest Service
Region 10
Tongass National Forest
Ketchikan Area
Federal Building
Ketchikan, AK 99901

Reply To: 1950

Date: SEP 24 1992

Dear Reader:

Enclosed is the Draft Environmental Impact Statement (EIS) for the Ketchikan Pulp Company Long-Term Timber Sale Contract for the Central Prince of Wales Project Area.

If you received a complete set of documents, the following items should be found in the package:

1. Draft Environmental Impact Statement and Appendices
2. Unit Card Appendix
3. Maps
   (a) Map of Existing Timber Condition
   (b) Alternative maps 2 through 5

If you elected to receive the summary set of documents, the following items should be found in the package:

1. Summary Draft Environmental Impact Statement
2. Maps
   (a) Map of Existing Timber Condition
   (b) Alternative maps 2 through 5

There will be a 45 day period during which you may review and comment upon the the Draft EIS. Written comments must be received by December 7, 1992. These comments should be addressed to:

David Arrasmith, IDT Planning Staff Officer
Ketchikan Area
Tongass National Forest
Federal Building
Ketchikan, Alaska 99901
(907) 225-3101

A series of open houses and subsistence hearings will also be held. Each meeting will start with a brief open house to answer your questions, followed with a subsistence hearing. These sessions will be held according to the following schedule:

Date	Open House Time	Subsistence Hearing Time	Community	Location
November 17	6:00 PM	8:00 PM	Klawock	ANB Hall
November 18	6:00 PM	8:00 PM	Craig	City Council Chamber
November 19	6:00 PM	8:00 PM	Hydaburg	City Office Building
November 23	6:00 PM	8:00 PM	Ketchikan	St. John's Church
November 24	6:00 PM	8:00 PM	Saxman	Saxman City Hall
December 1	6:00 PM	8:00 PM	Thorne Bay	Bay Chalet
December 2	6:00 PM	8:00 PM	Whale Pass	Community Hall
December 3	6:00 PM	8:00 PM	Coffman Cove	Community Building

I want to encourage you to take the time to review and comment on the Draft EIS, as well as to participate in the subsistence hearings. Your input will be used to prepare the Final EIS and the Record of Decision. Your interest in the management of the Tongass National Forest is appreciated.

Sincerely,

Robert F. Vaught

for DAVID D. RITTENHOUSE
Forest Supervisor

Enclosures

United States Department of Agriculture
Forest Service
Region 10
Tongass National Forest
Ketchikan Area
Federal Building
Ketchikan, AK 99901

Reply To: 1950

Date: OCT 30 1992

Dear Reader:

The Central Prince of Wales Draft Environmental Impact Statement was mailed out October 13. It was inadvertently mailed out fourth class and may not have been received by some individuals prior to the notice of availability appearing in the Federal Register. Therefore, the comment period for the Draft Environmental Impact Statement of Central Prince of Wales has been extended from December 7, 1992 to December 14, 1992. All comments must be received by December 14, 1992.

We apologize for any inconvenience and are looking forward to your comments.

Sincerely,

DAVID D. RITTENHOUSE
Forest Supervisor

921030 0930 IDT 1920 DM

Draft Environmental Impact Statement

Central Prince of Wales

United States Department of Agriculture
Forest Service - Alaska Region
Alaska

Lead Agency:	U.S.D.A. Forest Service Tongass National Forest Ketchikan Area
Responsible Official:	Forest Supervisor Ketchikan Area Tongass National Forest Federal Building Ketchikan, Alaska 99901
For Further Information Contact:	David Arrasmith, IDT Planning Staff Officer Ketchikan Area Tongass National Forest Federal Building Ketchikan, Alaska 99901 907 225-3101

ABSTRACT

The USDA Forest Service proposes to harvest approximately 290 million board feet (MMBF) of timber from an estimated 10,000 acres of the Central Prince of Wales (CPOW) Project Area, Thorne Bay Ranger District, Ketchikan Administrative Area, Tongass National Forest. Timber volume would be offered to the Ketchikan Pulp Company (KPC) under the KPC Long-Term Sale Contract (A10fs-1042), in approximately nine separate offerings ranging in size from 10 to 50 MMBF.

The Draft EIS describes six alternatives which provide different combinations of resource outputs and spatial locations of harvest units. The alternatives include: 1- no action, proposing no new harvest from the CPOW Project Area for the Long-Term Contract; 1a- no action/no harvest, proposing no new harvest and cancellation of ongoing timber harvest in the Project Area; 2- configuring harvest units to reduce harvest of high value wildlife habitat and protect the integrity of large unfragmented blocks of old growth; 3- configuring harvest units to reduce short-term impacts to subsistence users; 4- configuring harvest units to focus on providing economical timber harvest for this timber entry; 5- configuring harvest units to provide economically viable timber harvest, maintain integrity of large unfragmented blocks of old growth, and protect important scenic areas.

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Key Terms

Log Transfer Facility (LTF) - a facility used for transferring commercially harvested logs to and from a vessel or log raft, or the formation of a log raft.
Long-Term Contract - Long-Term Timber Sale Contract with Ketchikan Pulp Company
Management Indicator Species (MIS) - species of vertebrates and invertebrates whose population changes are believed to best indicate the effects of land management activities
Mitigation - measures designed to counteract environmental impacts or to make impacts less severe
Monitoring - process of collecting information to evaluate whether or not objectives of a project and its mitigation plan are being realized
Riparian - transition zone between a stream or lake system and the adjacent land
Sawlog - that portion of a tree that is suitable in size and quality for the production of dimension lumber
Scoping - early and open activities used to determine the scope and significance of a proposed action
Subsistence - the customary and traditional uses by rural Alaskan residents of wild renewable resources for direct personal or family consumption and for customary trade
Utility log - those logs that do not meet sawlog grade but are suitable for production of firm useable pulp chips
Value Comparison Unit (VCU) - areas which generally encompass a drainage basin, containing one or more large stream systems; boundaries usually follow easily recognizable watershed divides.
Volume Classes - used to describe the average volume of timber per acre in thousands of board feet

Overview of the Project

The USDA Forest Service is proposing to harvest approximately 290 million board feet (MMBF) of timber from an estimated 10,000 acres of the Central Prince of Wales (CPOW) Project Area of the Tongass National Forest, Ketchikan Administrative Area, Thorne Bay Ranger District. This Draft Environmental Impact Statement (Draft EIS) has been prepared in accordance with the National Environmental Policy Act (NEPA) to solicit public input on the environmental and social consequences of this proposed action and alternative courses of action.

The project formally began on August 30, 1991, with the issuance of a Notice of Intent to proceed with the environmental analysis of the project. Public scoping was conducted during September and October 1991, via mailings and local news media, to solicit issues to be addressed in the Draft EIS. Scoping feedback mailings and meetings were held in April 1992 to disclose the tentative issues and alternatives and to answer questions from the public.

After this Draft EIS is published, a 45-day comment period will take place during which written and verbal comments on the alternatives will be sought. During this same time, subsistence hearings will be held to hear from those whose subsistence use of resources may be affected by proposed activities, as required by the Alaska National Interest Lands Conservation Act (ANILCA). Dates and locations are announced in the letter accompanying this document. Public comments on the Draft EIS, as well as from the subsistence hearings, will be used in the preparation of the Final EIS.

Project Area

The 321,866-acre Project Area is located on Prince of Wales Island, approximately 50 air miles northwest of Ketchikan, Alaska. See Figure Sum-1 for a Project Area vicinity map. The Project Area encompasses all or portions of TLMP management areas K03, K07, K08, K09, K10, K14, and K15. These are further subdivided into 28 Value Comparison Units (VCU's), whose boundaries generally follow watershed divides.

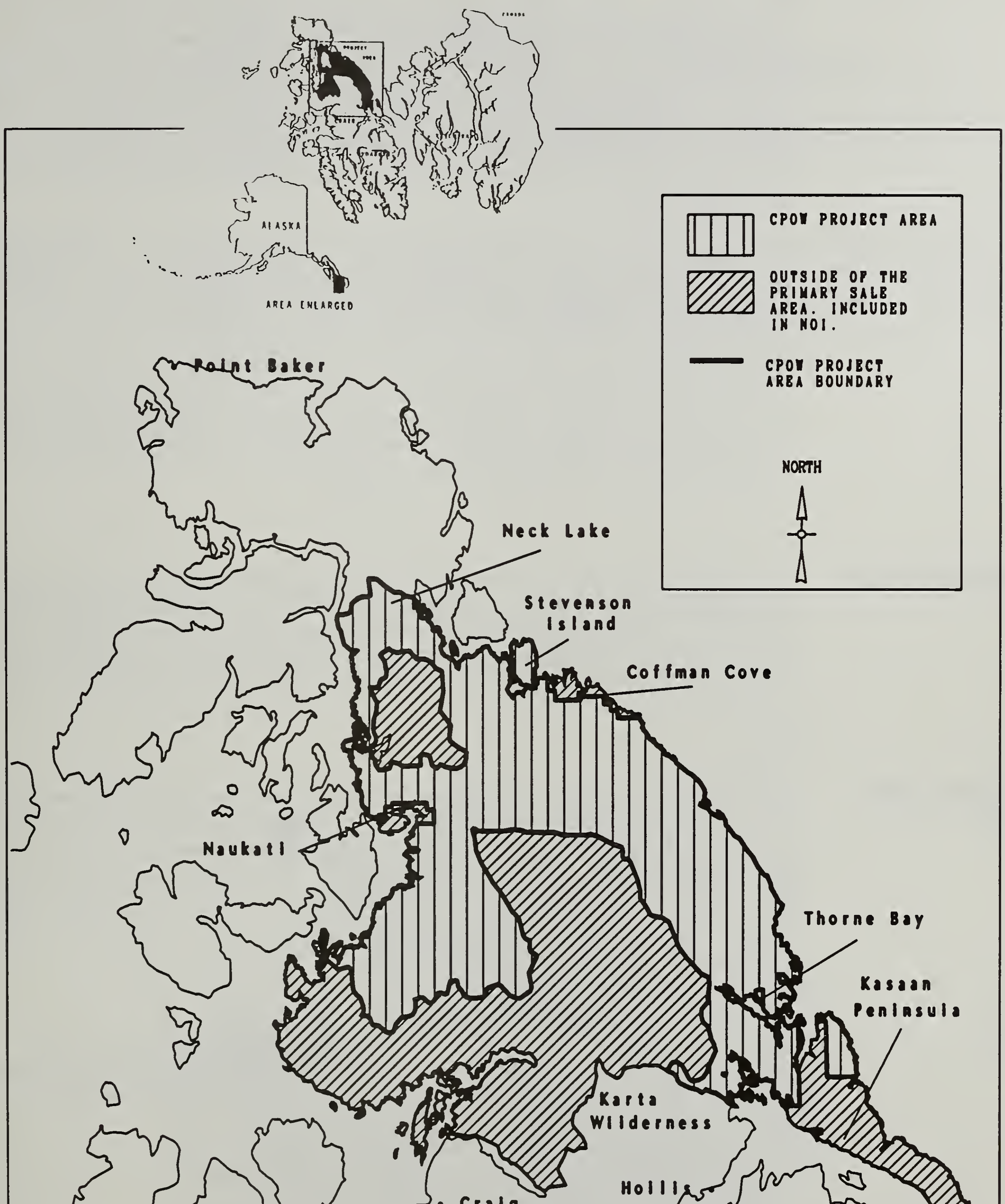
Purpose of and Need for Action

This project is intended in part to help satisfy the three-year current timber supply requirement of the Long-Term Contract with the Ketchikan Pulp Company (KPC). There also is a need to help satisfy the obligation set by Congress under the Tongass Timber Reform Act (TTRA) of 1990, directing the Forest Service to seek to provide a supply of timber which meets annual market demand to the extent consistent with providing for the multiple use and sustained yield of all renewable forest resources. For this project the volume has been determined to be approximately 290 MMBF, reflecting a management decision based on the most current schedule to provide a three-year timber supply of 615 MMBF for the KPC Long-Term Contract (Appendix A). The purpose and need is further to move to implement the TLMP (1979, as amended), thereby moving from the existing forest condition to the desired future condition, as specified in the TLMP Management Direction/Emphasis for the management areas within the Project Area.

Contract Obligations

The Long-Term Contract, originally signed in 1951 and modified most recently in 1991, calls for a total of 8.25 billion board feet of timber to be supplied to KPC. Under the terms of the modified contract, the Forest Service is required to "develop a tentative Offering schedule...[which] shall list sufficient timber volume and schedule commencement of the NEPA process...to provide [KPC] a Current Timber Supply sufficient for at least three years of operations...." Further, the Forest Service is required to "seek to specify sufficient Offerings to maintain a Current Timber Supply in all Offering areas that totals at least three years of operations...and which meets the production requirements of [KPC's] manufacturing facilities." The most recent three-year analysis of Current Timber Supply (15 February 1992) requires the Forest Service to seek to maintain an annual sawlog supply of 615 MMBF of harvestable timber that has been cleared through the NEPA process.

Figure Sum-1
Project Area Vicinity Map



Existing and Desired Future Condition

The existing condition of the Project Area is approximately 95 percent forested, with about 24 percent in noncommercial (scrub) timber, 28 percent in second growth, and 43 percent in old-growth commercial forest. The area is heavily roaded. The Project Area provides habitat for numerous wildlife species including deer, black bear, martens, and bald eagles. Salmon and native trout spawn in the numerous streams. Recently, significant caves have been discovered and explored. The Project Area provides recreation, subsistence, and employment opportunities for many individuals and communities.

The desired future condition, as specified in the Management Direction/Emphasis for each management area, was established through the Forest planning process and is presented in the TLMP (1979a, as amended 1986). The management emphasis and direction was further refined as the Desired Future Condition in the TLMP Draft Revision (1991a). It consists of a mosaic of timber stands of varying sizes and ages, interspersed with areas of old growth and nonforest vegetation, furnishing a sustained yield of timber in balance with other resources and uses, including riparian areas, water quality, fish habitat, sensitive visual resources, recreation opportunities, and old-growth stands and their associated wildlife.

Proposed Action

The Tongass National Forest, Ketchikan Area, proposes to harvest approximately 290 MMBF of timber from an estimated 10,000 acres on Prince of Wales Island. This will be accomplished through approximately nine offerings beginning in 1993. Approximately 100 miles of new road will be built to access and remove the timber. Five existing Log Transfer Facilities (LTF's) would be used; no new LTF's are proposed.

Decision to be Made

The Ketchikan Area Forest Supervisor will decide whether, when, and how to make timber available from the CPOW Project Area to meet contractual commitments and implement the Forest Plan. The Forest Supervisor can decide to: (1) select one of the alternatives, including the no-action alternative, (2) modify an alternative as long as the environmental consequences of the modified action have been analyzed within the Final EIS, or (3) reject all alternatives. If an alternative is selected, it will be documented in the Record of Decision (ROD).

Issues

As a result of public scoping meetings, internal Forest Service concerns, and consultation with State, Federal, and other agencies and organizations, the following issues were identified as significant and requiring analysis in the Draft EIS:

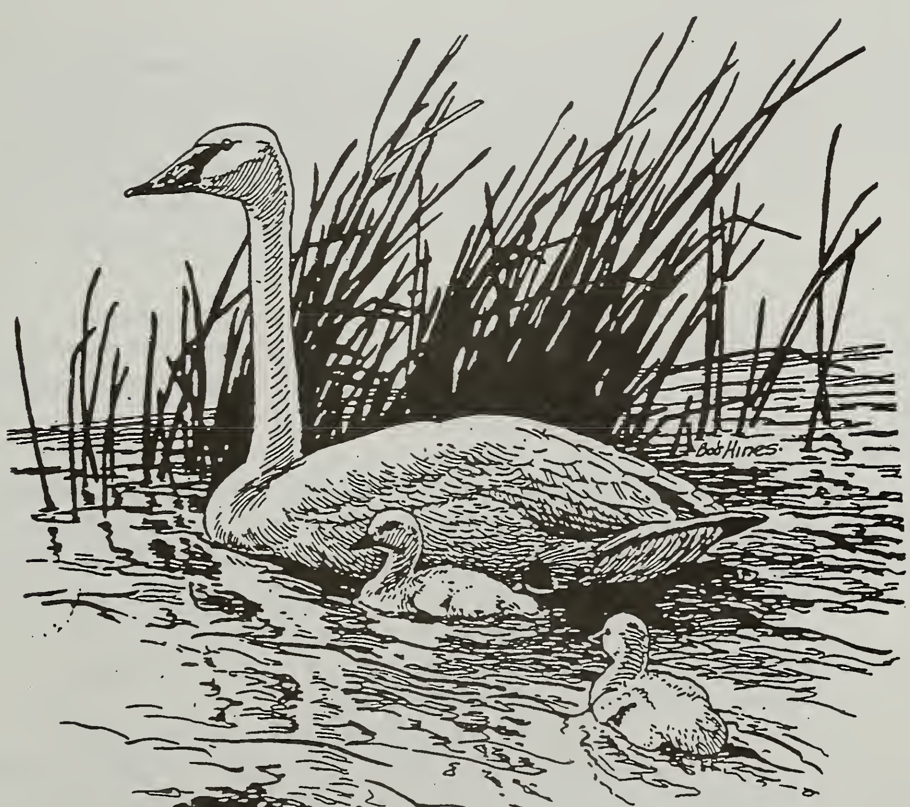
1. Cost effectiveness of timber harvest operations.
2. Impact of timber harvest operations on subsistence use.
3. Impact of timber harvest operations on wildlife habitat.
4. Impact of timber harvest operations within Honker Divide.
5. Impact of timber harvest operations on fish habitat and water quality.
6. Impact of timber harvest operations on visual quality and recreation.

The following issues raised by the public were considered but eliminated from detailed study because their resolution is beyond the scope of this document:

7. Impact of the alternatives on the long-term social and economic environment of area residents.
8. TLMP Land-Use Designations should be changed to eliminate or reduce the level of harvest and/or maximize specific resources.
9. CPOW should be delayed until the TLMP Revision is completed.
10. The Allowable Sale Quantity (ASQ) should be increased with this proposal.
11. Below-cost timber Sales should be eliminated.
12. Regional timber supply and demand should be refigured for the CPOW Project Area.

Availability of Documents

The Planning Record documenting the process of producing this EIS is available for review during regular business hours at the Forest Supervisor's office, Ketchikan, Alaska. Copies of the complete Draft EIS including appendices may be viewed at the Supervisor's Office or at public libraries and schools in the region, and are available upon request.



Development of Alternatives

Alternatives considered but eliminated

For this Draft EIS, several alternatives were considered but dropped from further study because they did not fully meet or greatly exceeded the stated purpose and need for the project.

Alternative A

This was a maximum timber alternative which proposed to harvest 317 individual harvest units totaling 408 MMBF of sawlog plus utility volume from 14,331 acres, and required the construction of 156 miles of new roads. It was dropped from consideration because it exceeded the stated purpose and need for the project by 118 MMBF (40 percent).

Alternative B

This was an alternative to analyze a reduced level of harvest from the CPOW Project Area. It was dropped from further consideration because it did not meet the stated purpose and need.

Alternatives C, D, E

These alternatives were presented to the public and selected agencies in April 1992 as Alternatives 2, 3, and 4, respectively. They all proposed to harvest less than the stated purpose and need, with proposed harvest levels of 269, 242, and 232 MMBF, respectively. They were eliminated from detailed study because they addressed issues in a similar fashion to Alternatives 2, 3, and 4 described in detail in this Draft EIS.

Alternatives Considered for Detailed Study

Six alternatives for making timber available to KPC from the CPOW Project Area were considered in detail. Detailed maps of proposed alternatives are included in the supplementary map packet.

Following the Items Common to All Alternatives, the alternatives are described here in the following manner: (1) the emphasis or intent of the alternative, and (2) guidelines used in selecting units and roads consistent with the emphasis. Resource outputs and activities are summarized in Table Sum-1. Alternatives are compared by issue and environmental consequences later in this summary.

Items Common to All Alternatives

• Each alternative was developed in accordance with the standards and guidelines of the TLMP Draft Revision, Alternative P. Examples include: Preliminary analysis indicates that each individual unit proposed for harvest by any of the action alternatives meets the TLMP revision standards and guidelines for riparian

management. No timber will be harvested within the 500-foot shoreline buffer or the 1,000-foot estuarine buffer. Each alternative meets the TLMP revision objective to contribute to the maintenance of viable populations of wildlife species.

• All units meet visual quality objectives (VQO's) proposed for this project.

• Individual harvest units which were designed to be greater than 100 acres were done in compliance with NFMA and the Alaska Regional Guide.

• All alternatives defer any timber harvest within those portions of the Thorne River system that have been identified as eligible for consideration under the Wild and Scenic Rivers Act.

• No new log transfer facilities (LTF's) are required.

• Units that were identified as being highly unstable or highly susceptible to landslides were not included for harvest under any alternatives.

• All units were designed to be economically feasible.

• No alternative proposes timber harvest from Stevenson Island because of economic, visual, and cultural resource concerns.

• All alternatives comply with Sec.103(e) of TTRA with regard to 100-foot buffers around Class I and II streams.

• All alternatives comply with Sec.301(c)(2) of the Tongass Timber Reform Act with regard to the proportional harvest of old-growth timber.

• Ecosystem management opportunities are being developed and are incorporated into the alternatives where appropriate. Some of the activities that are responsive include: snag patches; wildlife islands within clearcuts; maintenance of large, unfragmented blocks of old-growth forest; partial cuts for maintenance of visual quality; shelterwood harvest to maintain cedar component.

Alternative 1 (No Action)

Emphasis. The emphasis of this alternative is to propose no new timber harvest from the CPOW Project Area for the Long-Term Contract at this time. It does not preclude timber harvest from other areas at this time, or from the CPOW Project Area at some time in the future. It does not preclude harvest analyzed under previous NEPA documents but not yet felled as of the date of the CPOW ROD. NEPA requires a "No Action" alternative be analyzed in every EIS to serve as a benchmark by which effects of the other action alternatives are to be measured. The Existing Condition map, in the separate map packet, shows the distribution of vegetation associated with no new timber harvest.

Guidelines. There were no units selected for this alternative.

Alternative 1a (No Action/No Harvest)

Emphasis. The emphasis of this alternative is to propose no timber harvest from the CPOW Project Area effective on the date of the CPOW ROD. This alternative assumes complete cessation of all timber harvest activities in the Project Area,

including any areas analyzed under previous NEPA documents but not yet felled as of the date of the CPOW ROD. This affects harvest units totaling approximately 1,000 acres and 30 MMBF analyzed under the 1989-94 Long-Term Sale EIS (LTS EIS), and approximately 25 acres and 0.48 MMBF analyzed for independent timber sales. This alternative does not preclude timber harvest from other areas at this time, or from the CPOW Project Area at some time in the future. This alternative serves as a further benchmark by which to measure the effects of the other alternatives.

Guidelines. There were no units selected for this alternative.

Alternative 2

Emphasis. The emphasis of this alternative is to meet the stated purpose and need while configuring planned harvest units throughout the Project Area to reduce harvest of high value wildlife habitat and to maintain the integrity of large, unfragmented blocks of old-growth forest within Honker Divide. This approach emphasizes a deferral of harvest within the most valuable wildlife habitats and seeks to minimize the effects of forest fragmentation. This alternative focuses on harvest of areas already roaded or close to existing roads, thereby minimizing timber entry into unroaded areas. The Alternative 2 map, in the separate map packet, shows the harvest units and associated roads proposed by this alternative in relation to physical and geographic features of the Project Area.

Guidelines. Guidelines used in selecting units and roads which would be consistent with the emphasis of Alternative 2 include the following:

Defer timber harvest within all known goshawk habitat management areas.

Defer timber harvest within the large, unfragmented blocks of old-growth forest within Honker Divide and within the smaller, unfragmented block in the Staney Creek area. Much of this area is high value habitat for wildlife species thought to be associated with large blocks of old-growth forest.

Minimize forest fragmentation in other areas by concentrating timber harvest adjacent or in close proximity to existing roads.

Alternative 3

Emphasis. The emphasis of this alternative is to meet the defined purpose and need while configuring planned harvest units throughout the Project Area to reduce short-term impacts to subsistence users by deferring harvest on currently important subsistence use areas. Most land-based susbsistence use occurs adjacent to the beach, the existing road system, or existing communities. Subsistence use is not prevalent in areas which remain largely unroaded, according to the Tongass Resource Use Cooperative Survey (TRUCS). The Alternative 3 map, in the separate map packet, shows the harvest units and associated roads proposed by this alternative in relation to physical and geographic features of the Project Area.

Guidelines. Guidelines used in selecting units and roads which would be consistent with the emphasis of Alternative 3 include the following:

Defer timber harvest in areas currently designated by the TRUCS as high use subsistence areas.

Minimize timber harvest in areas identified by the 1989-94 LTS EIS to be high value subsistence use areas.

Minimize timber harvest close to communities.

Alternative 4

Emphasis. The emphasis of this alternative is to meet the stated purpose and need while configuring planned harvest units throughout the Project Area with an increased focus on providing economic viability for this timber entry. This alternative does not propose any helicopter timber harvest. This approach emphasizes positive net economic return to KPC for the proposed harvest units, by seeking to minimize logging and road costs. This alternative focuses on harvest of units where the timber volume per acre is relatively high (subject to TTRA proportionality constraints) and where the harvested volume exceeds 2.0 MMBF per mile of new road construction. The Alternative 4 map, in the separate map packet, shows the harvest units and associated roads proposed by this alternative in relation to physical and geographic features of the Project Area.

Guidelines. Guidelines used in selecting units and roads which would be consistent with the emphasis of Alternative 4 include the following:

Defer timber harvest in units scheduled for helicopter yarding.

Confine timber harvest to units which average more than 20 MBF per acre.

Select groups of harvest units which are planned to exceed 2.0 MMBF of yarded volume per mile of new road construction.

Alternative 5

Emphasis. The emphasis of this alternative is to meet the defined purpose and need by configuring planned harvest units throughout the Project Area to provide for economically viable timber harvest; to maintain the integrity of large, unfragmented blocks of old-growth forest within Honker Divide; and to protect important scenic areas. This approach emphasizes a positive net economic return for the proposed harvest units, while seeking to minimize the effects of forest fragmentation. This alternative focuses on harvest of higher volume stands, within TTRA proportionality constraints, which can provide a favorable ratio of yarded volume to mile of new road construction, while deferring harvest within the largest unroaded blocks of old-growth forest. The Alternative 5 map, in the separate map packet, shows the harvest units and associated roads proposed by this alternative in spatial context to physical and geographic features of the Project Area.

Guidelines. Guidelines used in selecting units and roads which would be consistent with the emphasis of Alternative 5 include the following:

Defer timber harvest within the large, unfragmented blocks of old-growth forest within Honker Divide.

Defer timber harvest in the extended rotation and old-growth habitat areas identified by the 1989-94 LTS EIS which lay either within the large, unfragmented blocks of old-growth forest within Staney Creek or within the scenic viewshed (SV) LUD identified by the TLMP Draft Revision, Alt.P.

Defer timber harvest in areas within the nesting area and the post-fledging area of all known goshawk management areas.

Confine timber harvest to units which average more than 20 MBF per acre.

Select groups of harvest units which are planned to exceed 1.5 MMBF of yarded volume for every mile of new road construction.

Preferred Alternative

The USDA Forest Service has not identified a preferred alternative for the Draft EIS.

Summary Comparison

Table Sum-1 provides a summary of outputs and environmental consequences by which the alternatives may be compared.

Table Sum-1
Summary Comparison of Alternatives

Activity	Units	Alt.1	Alt.1a	Alt.2	Alt.3	Alt.4	Alt.5
Units	Number	0	0	226	233	214	216
Estimated volume	MMBF	0	0	300	295	278	296
Partial cut (visuals)	Acres	0	0	0	124	0	0
Shelterwood harvest	Acres	0	0	385	286	0	339
Clearcut harvest	Acres	0	0	9,933	10,290	9,557	9,789
Total harvest	Acres	0	0	10,318	10,700	9,557	10,128
Units over 100 acres	Number	0	0	27	28	21	25
Highlead harvest	MMBF	0	0	113	111	142	110
Small skyline harvest	MMBF	0	0	85	93	119	92
Slackline harvest	MMBF	0	0	13	13	17	18
Helicopter harvest	MMBF	0	0	89	78	0	76
Estimated stumpage	$/MBF	NA	NA	$36.01	$26.77	$35.22	$39.68
Returns to State	$M	0	0	6,715	6,597	6,933	6,587
Average jobs over 4 years	Jobs	0	0	650	640	603	642
Specified road constr.	Miles	0	0	92	111	109	80
Temporary road constr.	Miles	0	0	6	8	10	10
Road reconstruction	Miles	0	0	90	81	86	101
High use subsistence (TRUCS)	Acres harvested	0	0	3,252	0	2,764	3,086
High use subsistence (LTS EIS)	Acres harvested	0	0	283	78	391	365
Old growth habitat (LTS EIS)	Acres harvested	0	0	1,781	2,260	2,993	1,718
High vol.,unfrag.,old-grw.blocks >1,000 ac.	Acres	22,176	22,176	13,345	11,204	10,164	12,889
Harvest in lg. old-grw. blocks in Honk.Div.	Acres	0	0	0	916	984	0
MIS - deer	habitat capability	9,409	9,444	9,146	9,156	9,123	9,132
MIS - bear	habitat capability	477	477	474	474	474	474
MIS - marten	habitat capability	469	473	449	448	448	448
MIS - river otter	habitat capability	126	126	124	125	125	125
MIS - hairy woodpecker	habitat capability	3,522	3,552	3,286	3,395	3,295	3,375
MIS - brown creeper	habitat capability	5,113	5,192	4,794	4,969	4,806	4,908
MIS - Van.Can.goose	habitat capability	972	975	943	941	942	943
MIS - bald eagle	habitat capability	336	336	331	333	332	331
Very high mass movement (MMI 4)	Acres harvested	0	0	0	0	0	0
High mass movement (MMI 3)	Acres harvested	0	0	3,672	4,089	3,073	3,548
Medium mass movement (MMI 2)	Acres harvested	0	0	1,895	1,670	1,922	1,899
Low mass movement (MMI 1)	Acres harvested	0	0	4,751	4,941	4,562	4,681
Wetlands harvested/roaded	Acres	0	0	3,938	5,013	4,926	3,824
Roads crossing Cl.I,II streams	Number	0	0	8	10	8	6
Change in ROS class from SPNM to RM	Acres	0	0	12,000	19,000	8,300	5,300
Roadless areas harvested	Acres	0	0	3,457	5,355	2,978	3,160
Recreation places with some harvest	Number	0	0	17	13	15	18
Harvest in Honker Divide (ridge to ridge)	Acres	0	0	515	1,052	1,316	358
High potential for cultural resources	Acres harvested	0	0	2,216	2,352	3,260	2,624
Potential caves	# of harvest units	0	0	28	23	34	33

Comparison of Alternatives

The following sections provide a comparison of alternatives by: (1) significant issue and (2) environmental consequence. For a comparison of alternatives by resource output and activity, see Table Sum-1.

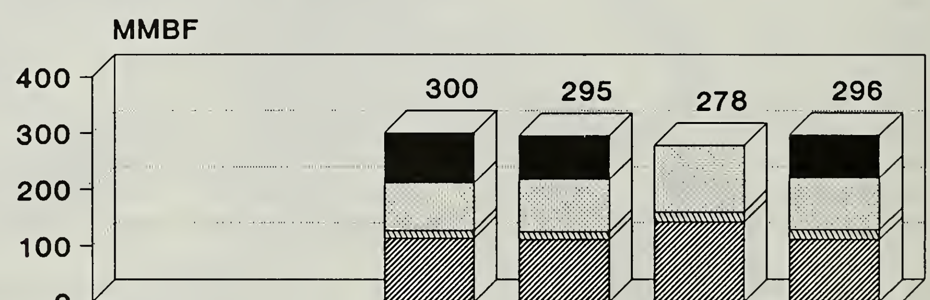
Comparison of Alternatives by Significant Issue

This section compares the alternatives in terms of the previously discussed significant issues. The baseline for comparing alternatives is Alternative 1, the no-action alternative.

Issue 1: Cost effectiveness of timber harvest operations

Estimated timber economics focuses on the residual value (stumpage) of the timber after all associated logging and transportation costs are subtracted. Generally speaking, the most expensive logging system is helicopter, followed by slackline. Helicopter yarding is necessary in areas where it is impractical to build road or where aerial logging is necessary to meet specific standards and guidelines. Alternative 2 has the most helicopter volume (89 MMBF), while Alternative 4 has none at all. Figure Sum-2 compares the logging systems proposed for each alternative.

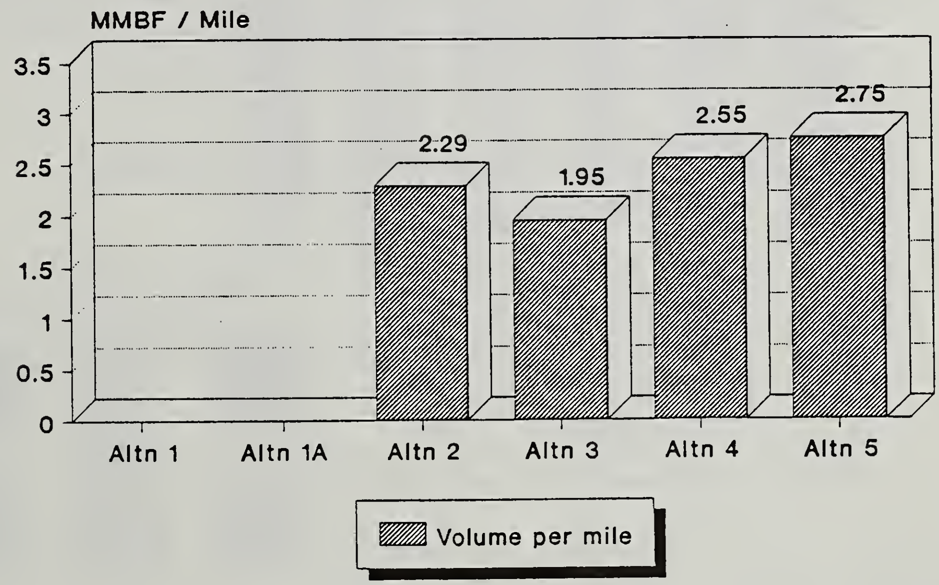
Figure Sum-2
Timber Harvest by Logging System



	Altn 1	Altn 1A	Altn 2	Altn 3	Altn 4	Altn 5
Helicopter	0	0	89	78	0	76
Small skyline	0	0	85	93	119	92
Slackline	0	0	13	13	17	18
Highlead	0	0	113	111	142	110

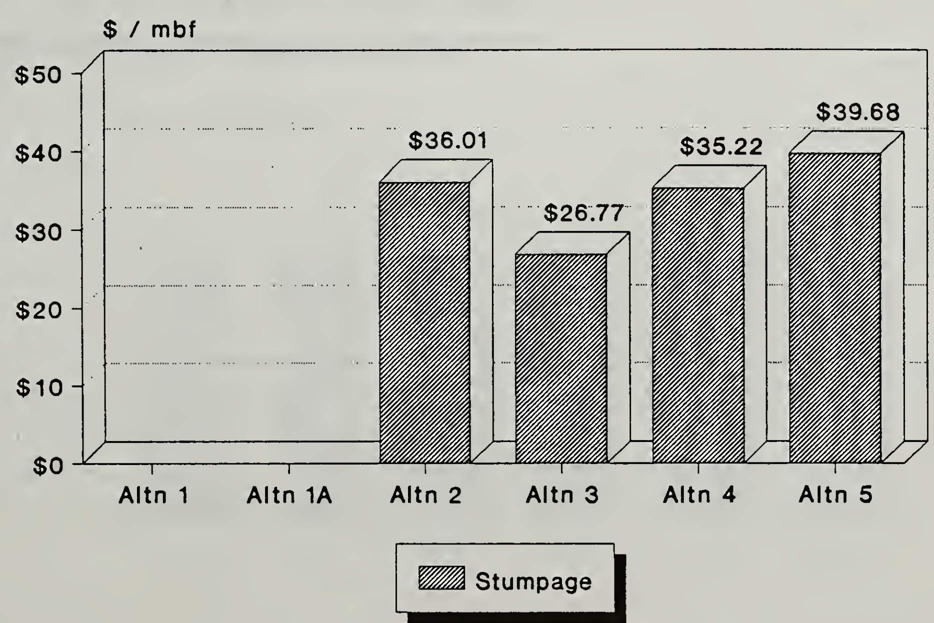
Another indicator of timber economics is the amount of non-helicopter volume which can be harvested per mile of new specified road construction (helicopter volume is excluded because it generally does not have associated new road construction). Alternative 4 (2.55 MMBF) and Alternative 5 (2.75 MMBF) have the best timber recovery in terms of MMBF per mile of new road construction, while Alternative 3 has the least (1.95 MMBF). Figure Sum-3 shows timber recovery by alternative, as expressed by cable yarded volume per mile of new specified road construction.

Figure Sum-3
Cable Yarded Volume Per Mile of New Road Construction



All alternatives show a positive net stumpage, with Alternative 5 having the highest value and Alternative 3 having the lowest. Figure Sum-4 shows mid-market timber stumpage by alternative.

Figure Sum-4
Estimated Mid-Market Stumpage Value

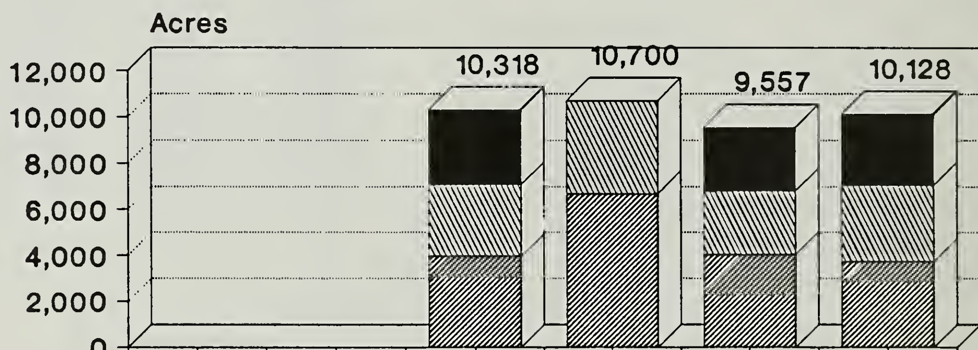


Issue 2. Impact of Timber Harvest Operations on Subsistence Use

Based on potential direct and cumulative effects of timber harvest and associated road construction, there may be a significant possibility of a significant restriction of subsistence use of deer within the Project Area under all alternatives, including the no-action alternatives. The proposed alternatives do not present a similar possibility of significantly restricting other subsistence uses.

The Tongass Resource Use Cooperative Survey (TRUCS) identified areas which are most heavily used by subsistence households. Based on the TRUCS, Alternative 3 harvests the fewest acres of high-use subsistence areas (0), while Alternative 2 harvests the most (3,252). Figure Sum-5 compares the harvest acres for each alternative in terms of importance to current subsistence use patterns.

Figure Sum-5
Subsistence Use of Harvest Units, Based on TRUCS

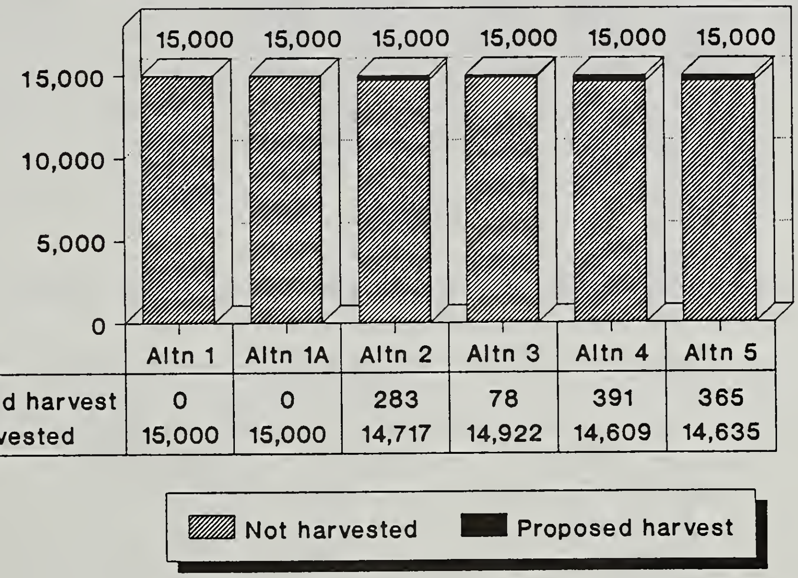


	Altn 1	Altn 1A	Altn 2	Altn 3	Altn 4	Altn 5
High use	0	0	3,252	0	2,764	3,086
Medium use	0	0	3,104	4,010	2,750	3,304
Low use	0	0	3,962	6,690	4,043	3,738

Low use   Medium use   High use

The 1989-94 LTS EIS identified approximately 15,000 acres within the CPOW Project Area that are currently heavily used by subsistence households. These areas are different from those identified by the TRUCS but are likely to have considerable overlap. Based on the 1989-94 LTS EIS, Alternative 3 proposes the least harvest in these areas (78 acres), while Alternative 4 proposes the most harvest (391 acres).

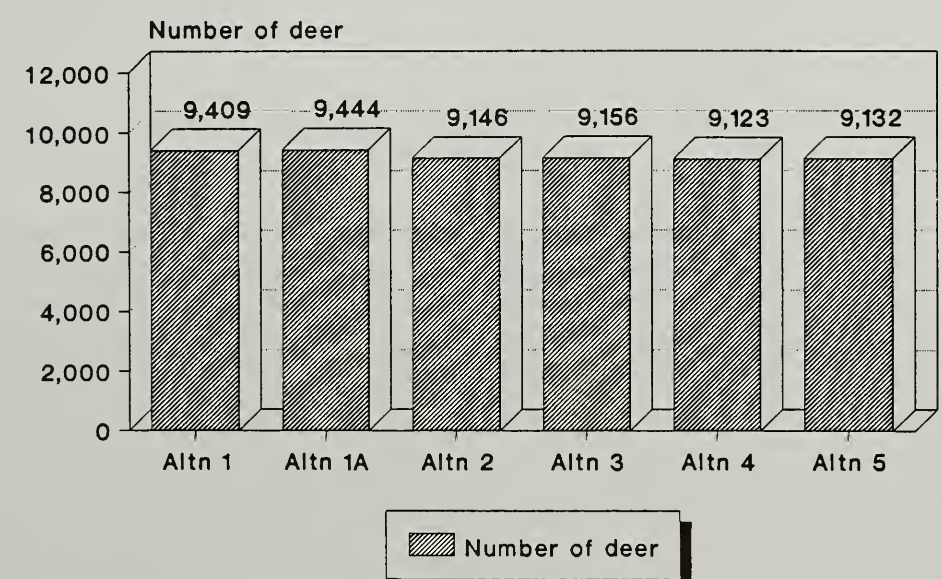
Figure Sum-6
Harvest in High-Use Subsistence Areas Identified by 1989-94 EIS



	Altn 1	Altn 1A	Altn 2	Altn 3	Altn 4	Altn 5
Proposed harvest	0	0	283	78	391	365
Not harvested	15,000	15,000	14,717	14,922	14,609	14,635

Deer hunting is one of the most important aspects of subsistence use, in terms of edible pounds consumed, affected by timber harvest. Computer models were used to estimate the effects of timber harvest on deer habitat capability. Based on this analysis, Alternative 1 causes no reduction of deer habitat capabilities. Among the action alternatives, Alternative 3 maintains the highest level of deer habitat capabilities (9,156), while Alternative 4 reduces deer habitat capabilities the most severely (9,123). Figure Sum-7 shows the estimated short-term (1996) deer habitat capability for each alternative.

Figure Sum-7
Estimated Deer Habitat Capability



Issue 3. Impact of timber harvest operations on wildlife habitat

The major effect on wildlife habitats in all action alternatives is the loss of old-growth forest habitat. Impacts to other habitats were greatly reduced by the interdisciplinary design of units prior to alternative formulation. All alternatives result in impacts consistent with the implementation of the TLMP and the TLMP Draft Revision, Alt.P (1991a).

Table Sum-2 shows the potential reduction in wildlife habitat capabilities, as estimated by habitat capability models, for the key Management Indicator Species (MIS) found in the CPOW Project Area. This table displays the 1954 long-term habitat capability and estimated short-term reduction in habitat capability after potential implementation of the alternatives.

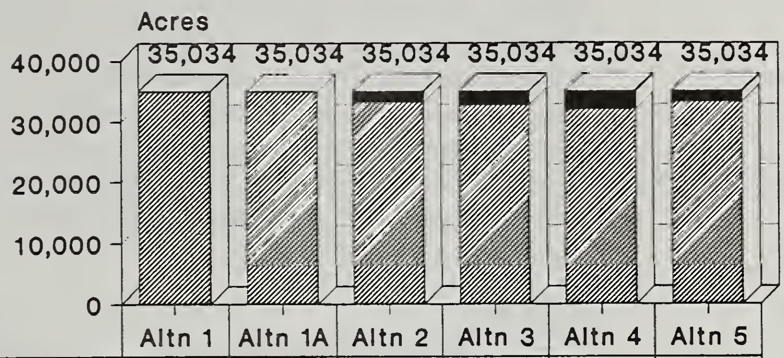
Table Sum-2
Potential Reduction in Habitat Capability for MIS in 1996

Species	Habitat Capability		Reduction from 1993					
	1954	1993	Alt1	Alt1a	Alt2	Alt3	Alt4	Alt5
Sitka b-t deer	14,942	9,409	0	0	263	253	286	277
Black bear	552	477	0	0	3	3	3	3
Otter	192	126	0	0	2	1	1	1
Marten	671	469	0	0	20	21	21	21
Hairy woodpecker	7,725	3,522	0	0	236	127	227	147
Brown creeper	17,725	5,113	0	0	319	144	307	205
Van.Can.goose	1,020	972	0	0	29	31	30	29
Bald eagle	518	336	0	0	5	3	4	5

The 1989-94 LTS EIS established areas that, for the duration of the project period, were to be managed to provide old-growth habitat conditions. These areas were commonly termed "old-growth retention" and were in compliance with the 1986 amendment to TLMP. Within the CPOW Project Area, 1989-94 LTS EIS designated 35,034 acres to be managed to provide old-growth habitat conditions. The TLMP Draft Revision proposes areas which provide old-growth habitat (beach fringe, primitive recreation, and estuarine fringe), which, along with TTRA stream buffers and legislated wilderness areas, are sufficient to meet old-growth habitat requirements as identified in the existing TLMP. Consequently, the old-growth habitat areas designated by the 1989-94 LTS EIS are being reconsidered for harvest by this project.

Figure Sum-8 shows the relationship of the proposed harvest of old-growth habitat to the amount established for the 1989-94 planning period. Alternative 5 proposes the least harvest (1,718 acres), while Alternative 4 proposes the most harvest (2,993 acres). In all cases the amount of old-growth habitat proposed for harvest is less than nine percent of the total 1989-94 old-growth habitat within the Project Area.

Figure Sum-8
1989-94 EIS Old-Growth Harvested Compared to Total 89-94 Old-Growth



	Altn 1	Altn 1A	Altn 2	Altn 3	Altn 4	Altn 5
OG habitat harvested	0	0	1,781	2,260	2,993	1,718
OG habitat unharvest	35,034	35,034	33,253	32,774	32,041	33,316

OG habitat unharvest OG habitat harvested

Forest fragmentation represents a change in the overall forest landscape from large, contiguous blocks of old-growth forest to smaller blocks separated by timber harvest units. Increased amounts of forest fragmentation indicate reduced habitat potential for species which are thought to be dependent on interior old-growth forest habitat. One way to analyze forest fragmentation is to measure the reduction of large, contiguous blocks of high volume old-growth forest (defined for the purposes of this analysis as those volume class 5 or higher and over 1,000 acres in size) as a result of timber harvest. The existing condition is displayed in Alternative 1, which shows there is a total of 22,176 acres of old-growth forest habitat in blocks over 1,000 acres in size. Table Sum-3 shows the remaining old-growth forest blocks greater than 1,000 acres in size after the proposed timber harvests of each alternative.

Table Sum-3
Effect of Timber Harvest on Forest Fragmentation, in Acres

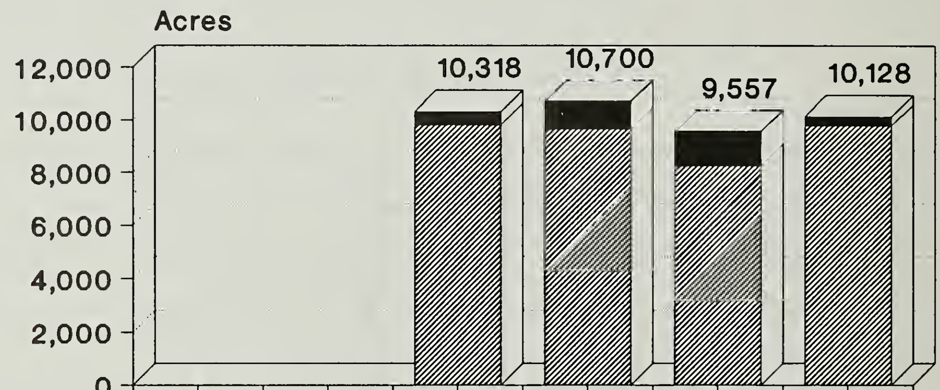
	Alt.1	Alt.1a	Alt.2	Alt.3	Alt.4	Alt.5
Acres of large, unfragmented blocks >1,000 acres	22,176	22,176	13,345	11,204	10,164	12,889

Issue 4. Impact of timber harvest operations on Honker Divide

Honker Divide has several commonly accepted definitions. The most expansive definition includes all lands drained by the Thorne River and Hatchery Creek watersheds from Barnes Lake to Thorne Bay. Based on this definition, Honker Divide has approximately 86,651 acres, of which 38,350 acres are within the CPOW Project Area. Figure Sum-9 shows the acres within this definition of Honker Divide that are proposed for harvest by the various alternatives. Alternative 5 proposes the least timber harvest within Honker Divide (358 acres), while Alternative 4 proposes the most harvest (1,316 acres).

Figure Sum-9

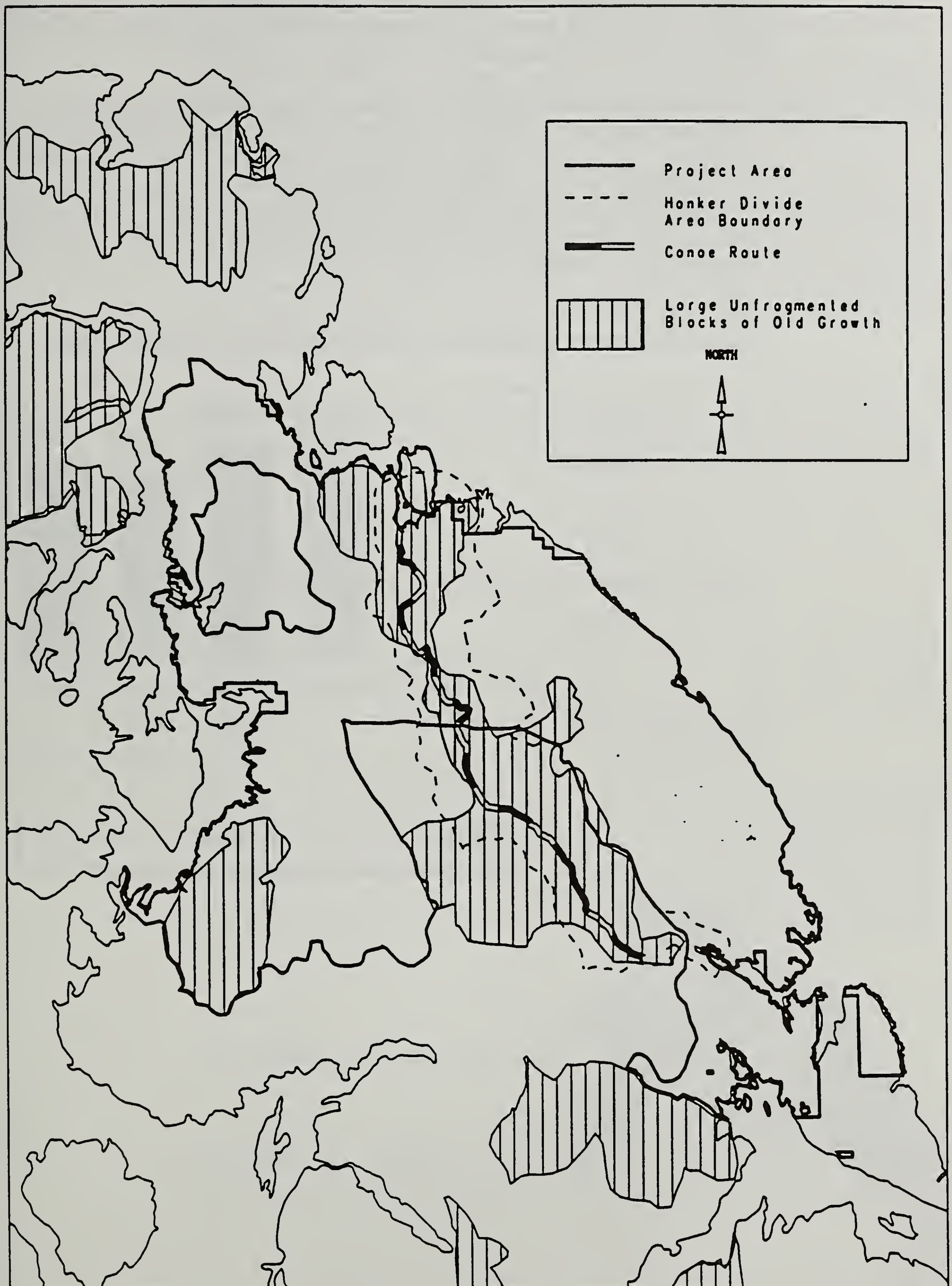
Timber Harvest in Honker Divide, Using Ridge-to-Ridge Boundary, Compared to Other Areas



	Altn 1	Altn 1A	Altn 2	Altn 3	Altn 4	Altn 5
Honker Divide	0	0	515	1,052	1,316	358
Outside Honker	0	0	9,803	9,648	8,241	9,770

Outside Honker Honker Divide

Figure Sum-10
Large Unfragmented Blocks of Old Growth

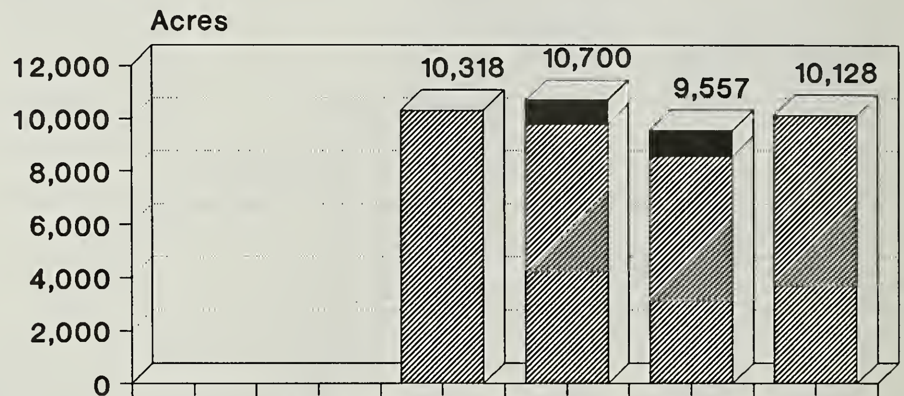


Another definition of the Honker Divide area is the proposed Scenic/Recreation River corridor in the Thorne/Hatchery system that is currently under consideration by the TLMP Draft Revision. There are approximately 24,357 acres within the proposed corridor, of which 11,276 acres are within the CPOW Project Area. The CPOW project has deferred harvest within this area.

A third definition of Honker Divide focuses on large, unfragmented blocks of old-growth forest within the lands drained by the Hatchery Creek and Thorne River watersheds. This large, unfragmented block of old-growth forest totals 58,240 acres, of which 21,569 acres lie within the CPOW Project Area. Figure Sum-11 shows the acres of harvest within this old-growth block proposed by each of the alternatives. Alternatives 2 and 5 propose the least amount of harvest (0 acres), while Alternative 4 proposes the most harvest (984 acres).

Figure Sum-11

Timber Harvest in Unfragmented Old-Growth Block in Honker Divide



	Altn 1	Altn 1A	Altn 2	Altn 3	Altn 4	Altn 5
Honker Divide OG	0	0	0	916	984	0
Other harvest	0	0	10,318	9,784	8,573	10,128

Other harvest   Honker Divide OG

Issue 5. Impact of Timber Harvest Operations on Fish Habitat and Water Quality

While there is potential for diminished water quality and fisheries production, current analysis shows there is no measureable effect on water quality or fisheries production from timber harvest or associated activities proposed by any of the action alternatives. All alternatives equally apply Best Management Practices (BMP) and TTRA requirements for protection of stream courses and adjacent AMHU prescription areas.

Fish habitat capability models are used to estimate the effects of timber harvest on the capability of streams to provide habitat for selected species of salmon and trout. Because there are many factors which influence fish populations—including commercial/sport harvest, oceanic conditions, and predation—these computer models provide only relative measures of habitat capability. These models indicate that there is no change in habitat capabilities for coho and pink salmon or for Dolly Varden char among the alternatives, including the no-action alternatives.

One measure of potential impacts of timber harvest on fish habitat is the associated new road construction and road reconstruction which crosses streamcourses. During placement of culverts or bridges, sediment may be introduced into the streams which may have a short-term effect on water quality. This is shown in Table Sum-4.

Table Sum-4
Road Construction and Reconstruction Crossing Streams

	Alt.1	Alt.1a	Alt.2	Alt.3	Alt.4	Alt.5
Number of crossings	0	0	109	103	108	115

Following timber harvest, there is an increased risk of landslides until second growth and the brush layer become firmly established. One way of analyzing this risk is to determine the amount of timber harvest on slopes which have high mass movement index (MMI) soils. Harvest of these slopes has a relatively small influence on introduction of sedimentation into fish-bearing streams, but does provide a measure of comparison among the alternatives. Table Sum-5 shows the proposed harvest on high MMI soils by alternative.

Table Sum-5
Acres of High MMI Soils Harvested

	Alt.1	Alt.1a	Alt.2	Alt.3	Alt.4	Alt.5
High MMI soils harvested	0	0	3,672	4,089	3,073	3,548

Issue 6. Impact of timber harvest operations on visual quality and recreation

For the purposes of this analysis 13 viewsheds have been identified as representing the most significant of the viewsheds within the Project Area. Table Sum-6 shows the proposed VQO's for each key viewshed, and the changes in viewshed condition by alternative.

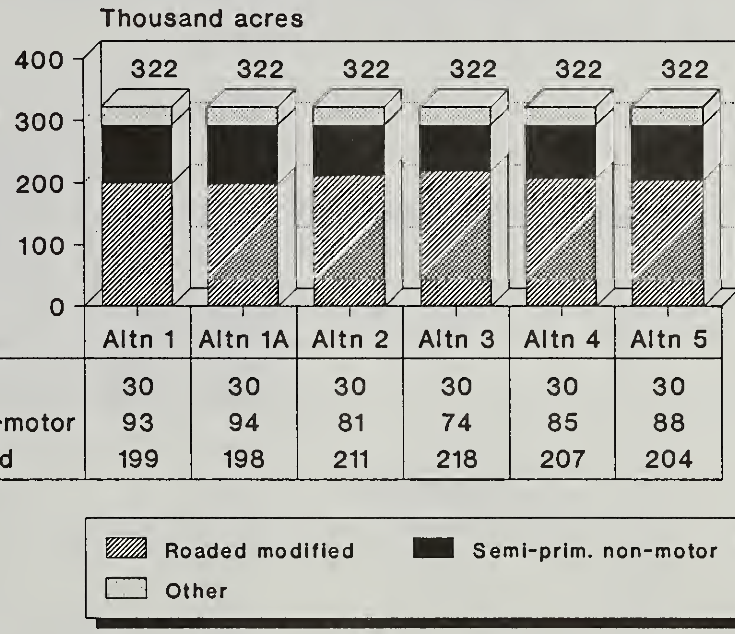
Table Sum-6
Proposed CPOW VQO's and Changes in Viewshed Visual Condition

Viewshed	CPOW Proposed VQO*	Changes in Viewshed Visual Condition*					
		Alt.1	Alt.1a	Alt.2	Alt.3	Alt.4	Alt.5
20 Rd-Summit	MM/MM	V	V	V	V	V	V
Staney Crk.Rd	M/MM	V	V	V	V	V	V
20 Rd-Naukati L.	MM/MM	III-IV	III-IV	IV	III-IV	IV	IV
20 Rd-Sarheen	MM/MM	II-V	II-V	III-V	III-V	III-V	III-V
20 Rd-Neck L.	MM/MM	II-V	II-V	II-V	II-V	II-V	II-V
Whale Pass	PR/M	III	III	III	IV	IV	IV
Sweetwater L.	R/PR/M	II-III	II-III	II-III	II-IV	II-IV	II-III
Hatchery L.	R/PR	IV	IV	IV	V	IV	IV
Baird Peak	M	I-III	I-III	IV	IV	IV	IV
Ratz Harbors	M/M	IV-V	IV-V	IV-V	IV-V	IV-V	IV-V
Thorne Bay	MM/MM	III-IV	III-IV	III-IV	III-IV	III-IV	III-IV
Lake Ellen Rd	MM/MM	V	V	V	V	V	V
Sal Creek	M/M	IV	IV	V	V	V	V

* I, II = R = Retention; III = PR = Partial Retention; IV = M = Modification;
V = MM = Maximum Modification; VI = Beyond Maximum Modification

Implementing any of the action alternatives will change the existing Recreation Opportunity Spectrum (ROS) class from semi-primitive nonmotorized (SPNM) to roaded modified (RM). Figure Sum-12 shows the change in ROS class by alternative.

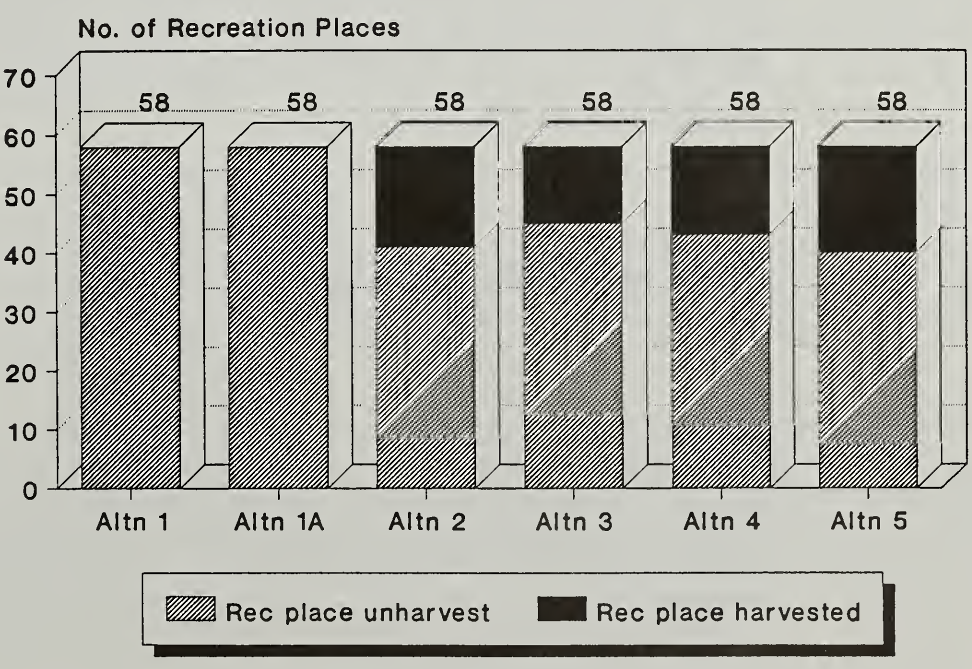
Figure Sum-12
Changes in ROS Class, by Alternative



	Altn 1	Altn 1A	Altn 2	Altn 3	Altn 4	Altn 5
Other	30	30	30	30	30	30
Semi-prim. non-motor	93	94	81	74	85	88
Roaded modified	199	198	211	218	207	204

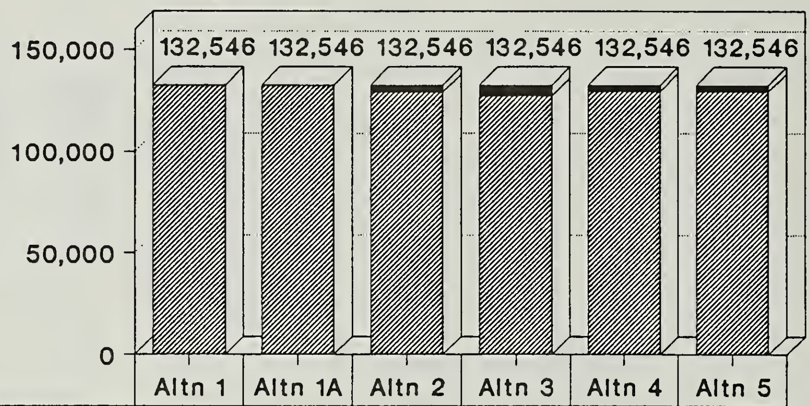
There are 58 inventoried recreation places within the Project Area. Of these, 13–18 will be affected by harvest activities proposed by any of the action alternatives. Figure Sum-13 shows the number of recreation places that will be affected by proposed harvest by alternative.

Figure Sum-13
Harvest within Recreation Places



The TLMP Draft Revision identified several roadless areas which lie within or partially within the Project Area. Of these, five have some timber entry proposed by the alternatives. Figure Sum-14 shows the number of roadless area acres proposed for harvest by alternative.

Figure Sum-14
Timber Harvest within Roadless Areas



	Altn 1	Altn 1A	Altn 2	Altn 3	Altn 4	Altn 5
Roadless harvest	0	0	3,457	5,355	2,978	3,160
Roadless unharvest	132,546	132,546	129,089	127,191	129,568	129,386

Comparison of Alternatives by Environmental Consequences

Environmental consequences for subsistence, timber, wildlife, fisheries, recreation, and visuals have already been summarized in the preceding section. Disclosure of impacts on other resources is summarized below by resource.

Threatened, Endangered, and Sensitive Species

There are no known threatened or endangered species within the CPOW Project Area. Consequently, none of the alternatives will have any effect on such species. The northern goshawk is listed as a category 2 candidate species. Three goshawk habitat management areas have been located within the Project Area—Sarheen, Hatchery, and Sarkar (near Salt Water Lagoon). The action alternatives propose harvest within two of these areas, as shown in Table Sum-7.

Table Sum-7
Harvest within Goshawk Habitat Management Areas, in Acres

Territory	Alt.1	Alt.1a	Alt.2	Alt.3	Alt.4	Alt.5
Sarkar	0	0	0	0	0	0
Sarheen	0	0	0	336	335	331
Hatchery Lake	0	0	102 *	321	386	206

* One of the development criteria for Alternative 2 was to defer harvest within known goshawk habitat management areas. No new nest tree has been found within the previously occupied goshawk management area near Hatchery Lake. The units proposed for Alt.2 (574-210 and 574-224) are adjacent to existing clearcuts and are not expected to degrade the goshawk habitat.

Socio-Economic Environment

The State of Alaska receives 25 percent of the sum of all net receipts from timber sold on National Forest land plus any purchaser road credits. This money is earmarked for public school and road maintenance funding. Table Sum-8 shows the estimated returns to the State of Alaska from sale of timber from the CPOW Project Area, as proposed by the alternatives. Actual returns will be based upon scaled volumes and appraised rates and may be significantly different from this estimate, which is based on estimated mid-market rates.

Table Sum-8
Estimated Returns to State of Alaska from Sale of CPOW Timber*

Alternative	Estimated Volume (MMBF)	Estimated Stumpage ($/MMBF)	Total Receipts (M$)	State of Alaska Returns (M$)
1	0	0	0	0
1a	0	0	0	0
2	300	36.01	10,803	6,715
3	295	26.77	7,897	6,597
4	278	35.22	9,791	6,933
5	296	39.68	11,745	6,587

* Based on mid-market rates.

By the year 1993, approximately 81,709 acres of timber will have been harvested from the CPOW Project Area. Assuming this harvest started with the beginning of the KPC contract in 1954, this averages to 2,095 acres harvested annually, which equates to approximately 63 MMBF annually. To meet the volume commitment to the Long-Term Contract, future timber entry of approximately 270 MMBF will occur within the CPOW Project Area by the termination date of the Long-Term Contract in 2004. (See Appendix A.) If the CPOW proposed action is implemented, there will be a total of 560 MMBF harvested between 1993 and 2004 . This is an average annual harvest of 51 MMBF.

Following the completion of the Long-Term Contract in 2004, there will not be sufficient volume remaining in the Project Area to sustain employment at current or historic levels. The result may be a disruption in local communities and logging camps which depend on timber employment, as timber harvesting shifts to other locations on the Forest. These workers will either have to relocate or commute to continue their current employment.

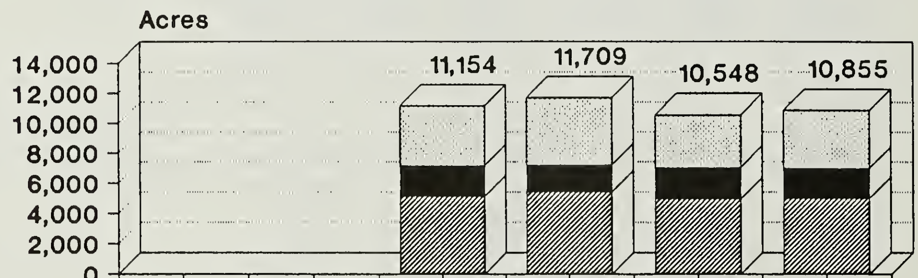
Based on this level of harvest and the estimate of 8.67 jobs generated per MMBF harvested, the level of timber-related employment from the Project Area was approximately 546 annual jobs for the period 1954-1993. This level of employment is expected to fall to 442 jobs for 1993-2004 (remaining period for the Long-Term Contract), and will be significantly less for the remaining 50 years of rotation.

Soils

The following is a risk assessment of landslide potential as a result of timber harvest and associated road construction. Complying with TLMP Draft Revison Alt.P standards and guidelines will reduce much of the landslide potential.

Landslides are most likely to occur as a result of timber harvest and associated road construction on landscapes with very high mass movement indices (MMI). There is no proposed CPOW harvest from any areas known to contain very high MMI soils. Landslides typically occur less frequently when these activites occur on areas with high MMI, and, in most cases, are less common on areas with medium or low MMI. Figure Sum-15 shows the number of acres disturbed by timber harvest and road construction by mass movement index.

Figure Sum-15
Acres of Timber Harvest and Road Construction by Mass Movement Index

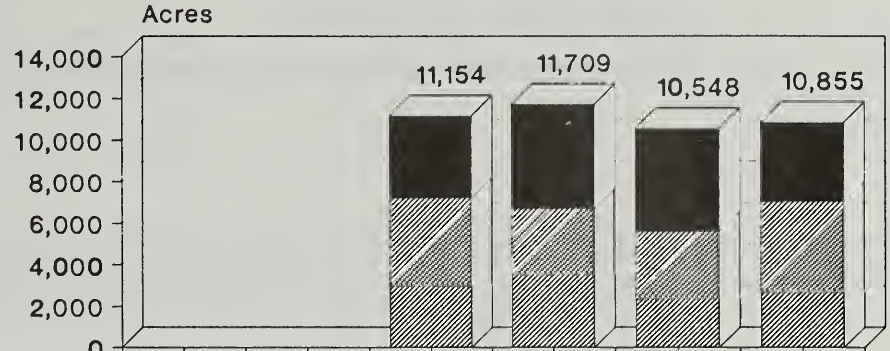


	Altn 1	Altn 1A	Altn 2	Altn 3	Altn 4	Altn 5
Very high	0	0	0	0	0	0
High	0	0	4,000	4,498	3,497	3,852
Medium	0	0	2,039	1,803	2,110	2,031
Low	0	0	5,115	5,408	4,941	4,972

Low Medium High Very high

Approximately 50 percent (169,962 acres) of the Project Area is classified as wetlands. Executive Order 11990 requires the Forest Service to minimize the long- and short-term adverse effects associated with the destruction or modification of wetlands. Best Management Practices dictate that road construction in wetlands should be avoided where practicable and that timber harvest within wetlands must be limited to low impact yarding systems. Figure Sum-16 shows the number of acres of wetlands with timber harvest and road construction activities.

Figure Sum-16
Wetlands With Timber Harvest and Road Construction Activities



	Altn 1	Altn 1A	Altn 2	Altn 3	Altn 4	Altn 5
Wetlands	0	0	3,938	5,013	4,926	3,824
Non wetlands	0	0	7,216	6,696	5,622	7,031

Non wetlands   Wetlands

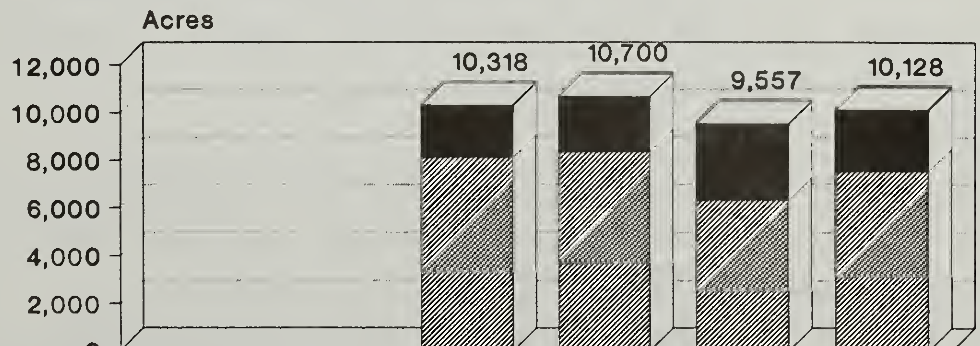
Wetlands = forested, non-forested, open

Cultural Resources

Cultural Resource Guidelines define high and low sensitivity zones, which are based upon the probability that they may contain significant cultural resources.

When sites are located, protection may be afforded through avoidance, protective enclosures, systematic monitoring, mandatory restrictions on project design, or recovery and documentation of the information. The type of protection required is based upon the significance of the information discovered. Figure Sum-17 shows the extent of areas with high potential to contain significant cultural resources.

Figure Sum-17
Acres of Areas with High Potential to Contain Significant Cultural Resources



	Altn 1	Altn 1A	Altn 2	Altn 3	Altn 4	Altn 5
High	0	0	2,216	2,352	3,260	2,624
Other	0	0	8,102	8,348	6,297	7,504

Other   High

Mitigation Measures

Mitigation measures are site-specific management activites which reduce the adverse impacts of timber harvest and associated activities. The Tongass National Forest uses unit cards to display appropriate mitigation measures which will be applied on a site-specific basis, as determined by reconnaissance, Forest Plan standards and guidelines, Best Management Practices (BMP's) and other laws and regulations. Unit cards have been developed for each harvest unit and associated road proposed by the various alternatives and have been published as Appendix D of the CPOW Draft EIS.

Information from the unit cards is summarized here and is categorized by resource.

RECREATION

1. After harvest is complete, close new road construction into units 553-221 and 553-222 to reduce vehicular access to adjacent Sarkar Lakes Management Area.

2. After harvest is complete, close new roads constructed into units 598-203, 598-205, 598-206, 598-207, and 598-249, in the Paul Young Creek area.

3. There are 11 units adjacent to the Sarkar Lakes Management Area. A boundary establishment needs to be completed prior to layout.

4. Recreation staff will assist in the design and location of roads within recreation places.

VISUALS

1. In order to meet the visual quality objectives proposed by this project, units 574-228 and 574-239 are prescribed for partial cut harvest; units 551-254 and 582-215 will require boundary configuration modification.

FISH, WATER QUALITY, AND SOILS

1. Best Management Practices (BMP's) are methods, measures, or practices to prevent or reduce water pollution. Their use is required by the TTRA and the Clean Water Act. Appendix C of the TLMP Draft Revision inludes a listing of recommended BMP's that will be followed.

2. Design stream crossings to provide fish passage for anadromous and resident fish. This applies to proposed new road construction or major road reconstruction crossing Class I and II streams.

3. Time road construction activities within all Class I and some Class II streamcourses to protect spawning adult fish and their eggs and fry from disturbance. This means road construction activities must be conducted during time periods that would not cause reductions in egg or fry survival or disturb

spawning adults. Generally road construction activities adjacent to streams will be restricted to the time period May 15 to August 15.

4. Where possible split yard on all identified streamcourses to maintain streambank stability and prevent stream sedimentation. There 10 units where it may not be possible to split yard on all identified streamcourses. In these instances, it will be necessary to provide full log suspension over these streams. These units should be monitored closely to assure that full log suspension is achieved:

5. Reduce the potential for landslides by providing for full bench road construction and end haul of waste in areas with very high potential for mass movement, as well as in other areas as determined by geotechnical engineers.

6. Another means of reducing the landslide potential is to maintain partial log suspension on all slopes with high mass movement potential. Ground disturbance should not exceed 10 percent. This should be closely monitored on units planned for highlead logging and 75 percent or more of the area classified as high MMI soils.

WILDLIFE AND THREATENED & ENDANGERED SPECIES

1. To provide microdiversity within harvested areas, leave windfirm, no-cut timber islands within proposed harvest units greater than 100 acres in size. These islands will vary in size from 1 to 5 acres, with the goal being to have 1 acre of no-cut, windfirm island per 20 acres harvested. The location of these islands will be determined during layout or sale administration, and will be designed in such a fashion as to not impose undue safety hazards on logging contractors.

2. Provide for habitat requirements of cavity and snag dependent Management Indicator Species (MIS) by leaving 275 snags per 100 acres averaged over each VCU. To provide for adequate distribution of snags within VCU's which have marginal numbers of snags, 13 units will have 0.1-acre (or larger) snag patches distributed throughout the unit, at a rate of 0.1 acre per 10 acres of unit. The location of these snag patches will be determined during layout or sale administration, and will be designed in such a fashion as to not impose undue safety hazards on logging contractors.

3. Region 10 goshawk management guidelines in effect at the time of unit release will be followed. The interim guidelines issued August 18, 1992, call for no harvest within the immediate timber stand (20–30 acres) containing an identified nest tree, limited harvest (five percent per decade) within the adjacent 600 acres (post-fledging area), and mapping out approximately 6,000 acres for the foraging area.

   All known goshawk nests and any new nests discovered during field recon or unit layout will be protected from timber harvest and blowdown by a minimum 660-foot buffer around the nest tree.

4. Due to the limited information available on nesting habitat requirements of marbled murrelets, any nests located during field recon or unit layout will be assessed on a case-by-case basis.

5. To protect wildlife habitat or populations from vehicular access, the access management plan will be implemented. Basically, this plan calls for the closure

(by gate) of all dead-end Local roads or other roads which provide access to wildlife habitat management areas.

6. Timber harvest units that are within a half mile of Barnes and Sweetwater lakes and Gold and Galligan Lagoon will have harvest and road construction operations limited to the time period when trumpeter swans are not present (normally from April 1 to October 31).

TIMBER

1. It is desirable to maintain the cedar component in stands where it naturally occurs. Because cedar tends to regenerate poorly following clearcut harvest in some stands, it is desirable to not harvest the mature cedar but to retain that vegetative structure for biodiversity and to establish cedar regeneration. Silvicultural methods such as seed tree or shelterwood are appropriate to meet specific resource objectives. Areas identified to be best suited for cedar regeneration include units within the cedar or mixed conifer plant association that are proposed for helicopter yarding and having either elevations over 1,200 feet (on north and east aspects) or over 1,500 feet (on south and west aspects).

CULTURAL RESOURCES

Cultural Resource Guidelines assign high and low sensitivity levels to areas based on their probability to contain significant cultural resources. This assignment is made upon several factors including: containing an existing, known site; lying below 100 feet elevation; having potential to contain caves; and being adjacent to major salmon streams or lakes. When cultural resources are discovered in proposed harvest units, the type of mitigation will vary according to the significance of the site. Types of mitigation measures include avoidance, protective enclosures, monitoring of harvest activities, restrictions on unit size or road location, and recovery and documentation of materials. Units which have been classified as high sensitivity will be surveyed during the 1992 field season.

CAVES

The standards and guidelines for cave resource management proposed for the TLMP Draft Revision have been formulated from field observations. Though the Federal Cave Resources Protection Act charges the Forest Service with protection only of significant caves, the Tongass National Forest is working to protect all significant karst resources. Until resource values are determined, the Ketchikan Area is considering all caves to be significant.

Increased emphasis has been put on identifying significant karst features and caves within the proposed timber sale units in order to mitigate the effects of surface management activities on the karst and cave resources. Upon completion of prescribed surveys, all cave resources identified within the areas of proposed activity will be evaluated. If a cave is found to be significant, it shall be nominated for listing on the National Register of Significant Caves. Alternative methods of timber harvest are being considered to protect these unseen features.

Specific Mitigation Efforts for caves include but are not limited to:

- Temporary suspension of work that might damage previously unknown sites discovered during the course of the project;

- Design of surface management activities so as not to impede or divert surface and groundwater flow into a cave or significant karst feature;
- Retention of vegetation in the vicinity of a cave or significant karst feature;
- Maintenance of buffers around all direct drainages into significant karst features.
- The felling of trees directionally away from a cave and its course, and avoidance of dragging timber across and/or through significant karst features.
- No use of significant karst feature as disposal sites for slash, spoils, or other refuse.
- Design of roads and related construction to avoid altering surface drainage into significant karst features or focusing sediment from road surface and/or drainage into significant karst features; careful design of excavations requiring blasting in the vicinity of a cave.
- Seasonal closures prohibiting construction activities in some areas to ensure protection of roosting and hibernating bats, nesting birds, seabird rookeries, or other wildlife;
- Maintaining confidentiality about specific site locations, and limiting public access as required.

Monitoring

Monitoring is designed to determine if the resource management objectives of the CPOW Final EIS have been met. The results will be used to verify implementation and effectiveness of selected mitigation and protection measures in a timely manner. Three types of monitoring were recognized in the development of the CPOW Monitoring Plan: Implementation, Effectiveness, and Validation. For details of each type of monitoring proposed for the CPOW Project Area—which includes a discussion of objectives, desired results, measurement, evaluation, responsible staff, record of results, annual cost, and FTE needs—see Chapter 2 of the CPOW Draft EIS.

Implementation Monitoring

Implementation monitoring assesses whether the project was implemented as designed and whether it complies with the Tongass Land Management Plan (TLMP). Unit Cards (Appendix D) will provide the basis for determining whether recommendations were implemented for various aspects of timber harvest. Implementation monitoring is part of the administration of a timber sale contract. The sale administrators and road inspectors assure that the prescriptions contained on the unit cards are implemented.

Best Management Practices

Implementation monitoring of soil and water resources will largely consist of monitoring Best Management Practices (BMP's) and Aquatic Habitat Management Unit (AHMU) prescriptions. BMP's, as defined in the Region 10 Soil and Water Conservation Handbook (FSH 2509.22) are procedures designed to ensure protection of soil and water resources. BMP's to be monitored at a specific site are determined through a review of unit/road cards, fish habitat reports, and other appropriate documentation.

Preharvest Issues of Concern

Preharvest issues of concern include land-disturbing activities on high MMI soils (BMP's 13.2, 13.5, and 13.16); road and landing locations (BMP's 13.10, 14.3, 14.6, through 14.10, and others); and channel stability and streamside management, including stream temperature sensitivity (BMP's 12.6, 12.7, 13.9, and 13.16). BMP's are prescribed for most all units or road segments. Review unit cards for all alternatives (Appendix D) to see how BMP's are prescribed.

Effectiveness Monitoring

Effectiveness monitoring seeks answers about the effectiveness of design features or mitigation measures in protecting natural resources and their beneficial uses. Monitoring records will be kept by the responsible staff.

Validation Monitoring

Validation monitoring is conducted to show if the assumptions or models used in planning are correct. It is usually carried out at the regional level in conjunction with research. Validation monitoring may or may not occur within the CPOW Project Area since this type of monitoring is built into a Forestwide Action Plan.

Chapter One

Purpose and Need

Chapter 1

Purpose and Need

Introduction

This chapter specifies the underlying purpose and need to which the Forest Service is responding in proposing alternatives in this Draft Environmental Impact Statement (EIS), including the proposed action. The USDA Forest Service proposed action is to harvest approximately 290 million board feet (MMBF) of timber from an estimated 10,000 acres of the Central Prince of Wales (CPOW) Project Area, Thorne Bay Ranger District, Ketchikan Administrative Area, Tongass National Forest. Timber volume would be offered to KPC in approximately nine separate offerings ranging in size from 10 to 50 MMBF. This action is proposed in order to help meet the three-year Current Timber Supply requirement of the Long-Term Timber Sale Contract (Long-Term Contract) between the Forest Service and the Ketchikan Pulp Company (KPC), and to contribute to the implementation of the Tongass Land Management Plan (TLMP, 1979a, as amended). This action is proposed to be consistent with the standards and guidelines of Alternative P of the TLMP Revision Supplement to the Draft EIS (TLMP Draft Revision 1991a) currently in preparation and expected to be in place by the time of the CPOW Record of Decision (ROD).

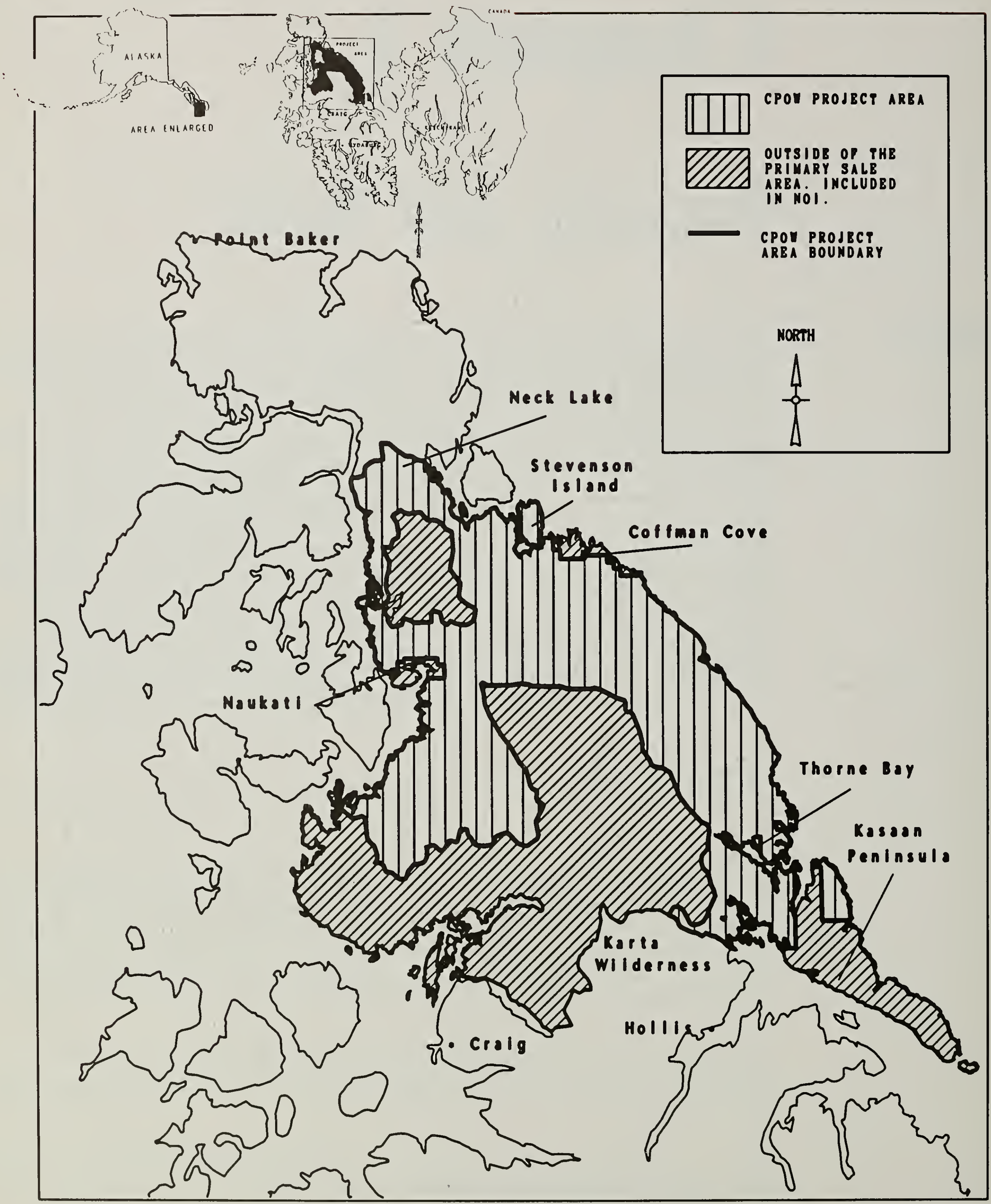
Project Area

The 321,866-acre Project Area is located on Prince of Wales Island approximately 50 air miles northwest of Ketchikan, Alaska. The original boundaries as announced by the Notice of Intent (NOI) (August 30, 1991) encompassed approximately 600,000 acres. Under the NOI, the proposed timber harvest was restricted to the Primary Sale Area portion of the Project Area. The background to the Long-Term Contract and to limiting the project to the Primary Sale Area are discussed later in this chapter.

The Project Area encompasses all or portions of TLMP (1979a, as amended) Management Areas K03, K07, K08, K09, and K10, which contain all or parts of 28 Value Comparison Units (VCU's), whose boundaries usually follow watershed divides.

Figure 1-1 displays the Project Area and its geographical relationship to the Ketchikan Area. Figure 1-2 displays the Management Areas located within the Project Area. Figure 1-3 displays the VCU's.

Figure 1-1
Central Prince of Wales Project Area Vicinity Map



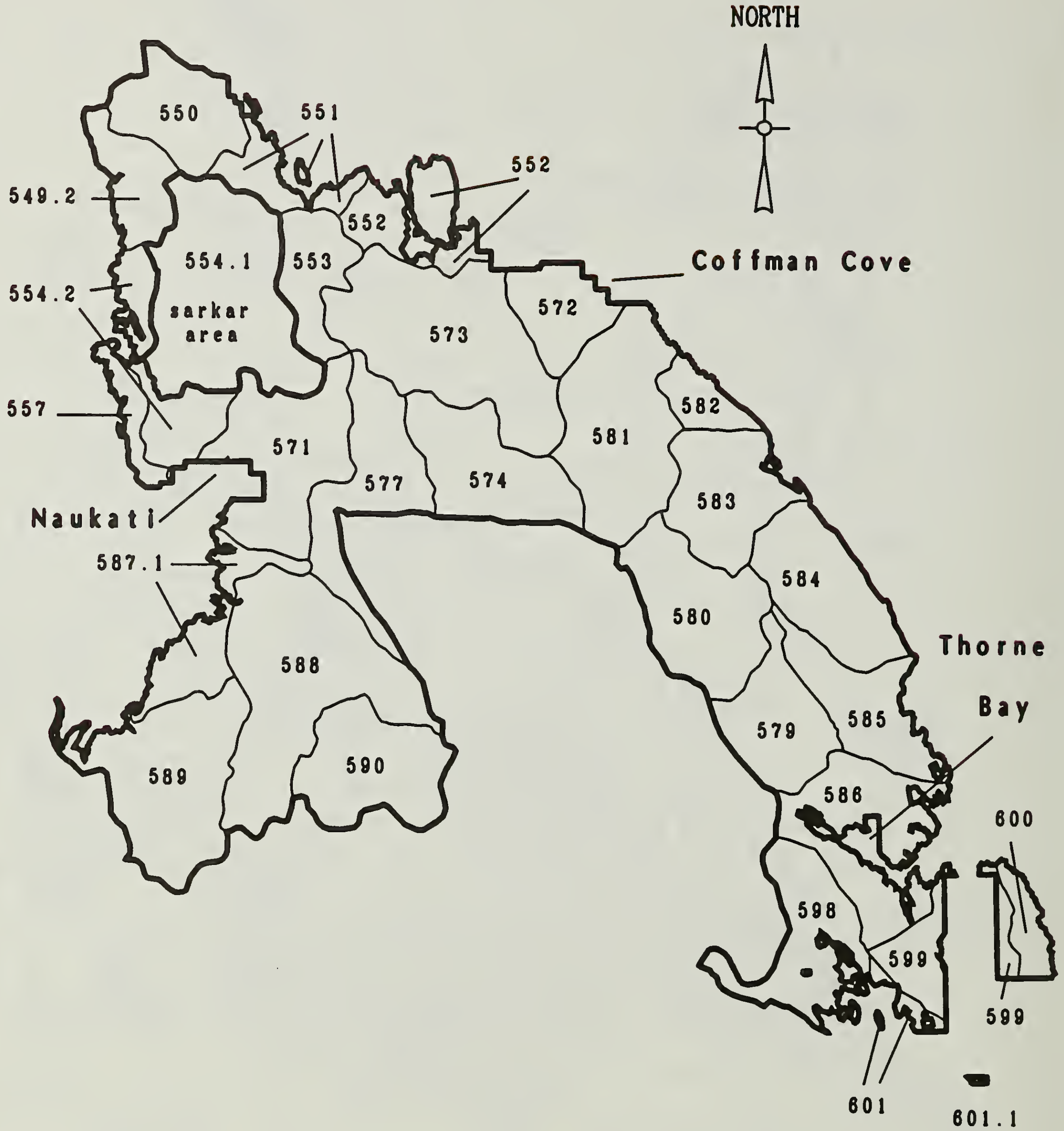
The CPOW boundary as announced in the NOI included areas outside the Primary Sale Area. Since timber harvest for this project is restricted to the Primary Sale Area, the CPOW Project Area will be illustrated in this EIS as consisting only of the Primary Sale Area.

Figure 1-2
CPOW Management Areas

MANAGEMENT AREAS
A management area (MA) is an area for which specific management direction was written in the Forest Plan (TLMP 1979a, as amended 1986). Management areas encompass one or more VCU's.

Portions of Management Areas K03, K08, and K10 extend beyond CPOW project boundaries. Management Area K06 (Sarkar) is excluded from the Project Area. The management areas are the same in both TLMP (1979a, as amended) and the TLMP Draft Revision (1991a).

Figure 1-3
CPOW Value Comparison Units (VCU's)



VCU's
Value comparison units (VCU's) are areas which generally encompass a drainage basin containing one or more large stream systems. Boundaries usually follow easily recognizable watershed divides.

Throughout this document (and in the separate map packet), VCU's may be referred to by either a 3-digit or 4-digit number, with or without a decimal point. For example, VCU 549.2 may also be written 5492; VCU 550 may also be written 550.0 or 5500.

Portions of VCU's 557, 574, and 577 extend beyond Project Area boundaries. VCU 554.1 (Sarkar) is excluded from the Project Area.

Purpose of and Need for Action

The purpose of and need for action is in part to help satisfy the three-year current timber supply requirement of the Long-Term Contract with Ketchikan Pulp Company (KPC). There also is a need to help satisfy the obligation set by Congress under the Tongass Timber Reform Act (TTRA) of 1990, directing the Forest Service "to provide a supply of timber from the Tongass National Forest which meets the annual market demand to the extent consistent with providing for the multiple use and sustained yield of all renewable forest resources." For this project the volume has been determined to be approximately 290 MMBF, a volume that reflects a management decision based on the most current schedule to provide a three-year timber supply of 615 MMBF for the KPC Long-Term Contract. (See Appendix A.) The purpose and need is further to move to implement the TLMP (1979a, as amended), thereby moving from the existing forest condition to the desired future condition, as specified in the TLMP Management Direction/Emphasis for the management areas within the Project Area.

The alternatives and actions considered in this analysis are possible approaches to meeting this purpose and need.

Contract Obligations

The Long-Term Contract with KPC was originally signed in 1951 and was most recently modified in February 1991 (see Background to the Long-Term Contract, later in this chapter). Under the terms of the modified contract, the Forest Service is required to "develop a tentative Offering schedule based upon the Tongass National Forest Land and Resource Management Plan, which shall display Offering Areas and timber volumes proposed for harvest.... The tentative schedule shall list sufficient timber volume and schedule commencement of the NEPA [National Environmental Policy Act] process by Offering Area or Areas to provide [KPC] a Current Timber Supply sufficient for at least three years of operations hereunder or until the contract termination date, whichever occurs first...." Further, the Forest Service is to "seek to specify sufficient Offerings to maintain a Current Timber Supply in all Offering Areas that totals at least three years of operations hereunder or until the contract termination date, whichever occurs first, and which meets the production requirements of [KPC's] manufacturing facilities." (KPC 1951, as amended)

The total timber harvest called for under the Long-Term Contract is 8.25 billion board feet. Analysis indicates that KPC needs to harvest 205 MMBF per year to complete the contract. Four timber projects were initiated for the KPC Long-Term Contract within the Primary Sale Area (PSA), as directed by the contract to seek to find timber supplies within the PSA before seeking volume within contingency areas. These four projects are needed to produce sufficient volume to provide KPC with 205 MMBF for the 1993 logging season, as well as to provide a three-year timber supply of 615 MMBF, as required by TTRA. There is expected to be 120 MMBF of timber volume remaining from a previous NEPA project which will be available to KPC by the time the CPOW Final EIS is released (approximately 30 MMBF within the CPOW Project Area). Therefore, these four timber projects need to produce a total of 700 MMBF, which, when combined with the 120 MMBF currently available, will provide volume for the 1993 logging season, plus a three-year timber supply, as required by TTRA.

This 700 MMBF was divided among the four timber projects based on the size of the project areas, as well as on their relative abilities to produce timber volume in an expedient fashion. Other factors considered in making this volume determination for the CPOW project included: (1) this harvest level is consistent with the sale schedule in the TLMP (1979a, as amended); (2) sufficient volume has been determined to be available in the CPOW Project Area; (3) there is an extensive road network in place; (4) the number and location of Log Transfer Facilities (LTF's) is sufficient to handle this volume of timber within a three-year time frame; (5) there are existing KPC-operated logging camps within the CPOW area to handle this volume; and (6) the current Forest Plan (TLMP 1979a, as amended) calls for harvest in this Project Area.

See Why the CPOW Project Area was selected, later in this chapter, for further discussion of the KPC contract.

Existing and Desired Future Condition

The existing condition of the CPOW Project Area is described in Chapter 3 of this EIS, in the "Affected Environment" portion of each resource section. The Project Area is approximately 95 percent forested, with about 24 percent in noncommercial (scrub) timber, 28 percent in second growth, and 43 percent in old-growth commercial forest. The area is heavily roaded. The Project Area provides habitat for numerous wildlife species including deer, black bear, martens, and bald eagles. Salmon and native trout spawn in the numerous streams. Recently, significant caves have been discovered and explored. The Project Area provides recreation, subsistence, and employment opportunities for many individuals and communities.

The desired future condition, as specified in the Management Direction/Emphasis for each management area, was established through the Forest planning process and is presented in the TLMP, as amended in 1986 (USDA Forest Service 1986). This management direction contained goals for timber, recreation, visuals, fish, wildlife, and other resources. In general, the Plan Outlook in the 1986 amended TLMP anticipated that timber-related employment would basically remain the same if more marginal timber could be harvested; other direction provided for fishery, wildlife, and recreation values in the areas not recommended for wilderness. More than half of the Forest was anticipated to remain in a basically unmodified state over time if current land use designations remained the same. For specific management emphasis and direction for each management area in the CPOW Project Area, see TLMP as amended in 1985-86 (USDA Forest Service 1986, Doc.147).

The management emphasis and direction was further refined as the Desired Future Condition in the TLMP Draft Revision (1991a). This desired future condition consists of a mosaic of timber stands of varying sizes and ages, interspersed with areas of old growth and nonforest vegetation, furnishing a sustained yield of timber in balance with other resources and uses.

Achievement of the TLMP Draft Revision desired future condition will require many decades. It will be reached by applying ecological resource management practices that are responsive to site-specific, on-the-ground conditions. Roaded access would be provided for suitable timber lands. Harvested old-growth timber will be converted to successive stands of younger trees. Timber including saw logs and utility volume will have contributed to the forest allowable sale quantity (ASQ).

Riparian areas will be managed to benefit riparian dependent resources. Water quality will continue to meet or exceed state standards. Fish habitat conditions will have been

maintained or improved. Sensitive visual resources, particularly as viewed from salt water, will have been conserved.

Recreation opportunities will continue to be associated with roads, motorized boat access from salt water, and float planes. These recreation opportunities will be maintained or improved.

Old-growth stands will be reduced and fragmentation will increase. However, remaining old-growth is consistent with the predicted cumulative effects shown in the TLMP Draft Revision (1991a). Remaining old growth will contribute to habitat capability for ensuring maintenance of well distributed viable populations. Management will be adjusted to accommodate any verified use of the area by threatened, endangered, or sensitive species.

Proposed Action

The Tongass National Forest, Ketchikan Area, proposes to harvest approximately 290 MMBF of timber from an estimated 10,000 acres on Central Prince of Wales Island. This will be accomplished through a series of offerings beginning in 1993. Approximately 100 miles of new road would be built to facilitate timber removal. Five existing Log Transfer Facilities (LTF's) would be used to implement the proposed action; no new LTF's are proposed.

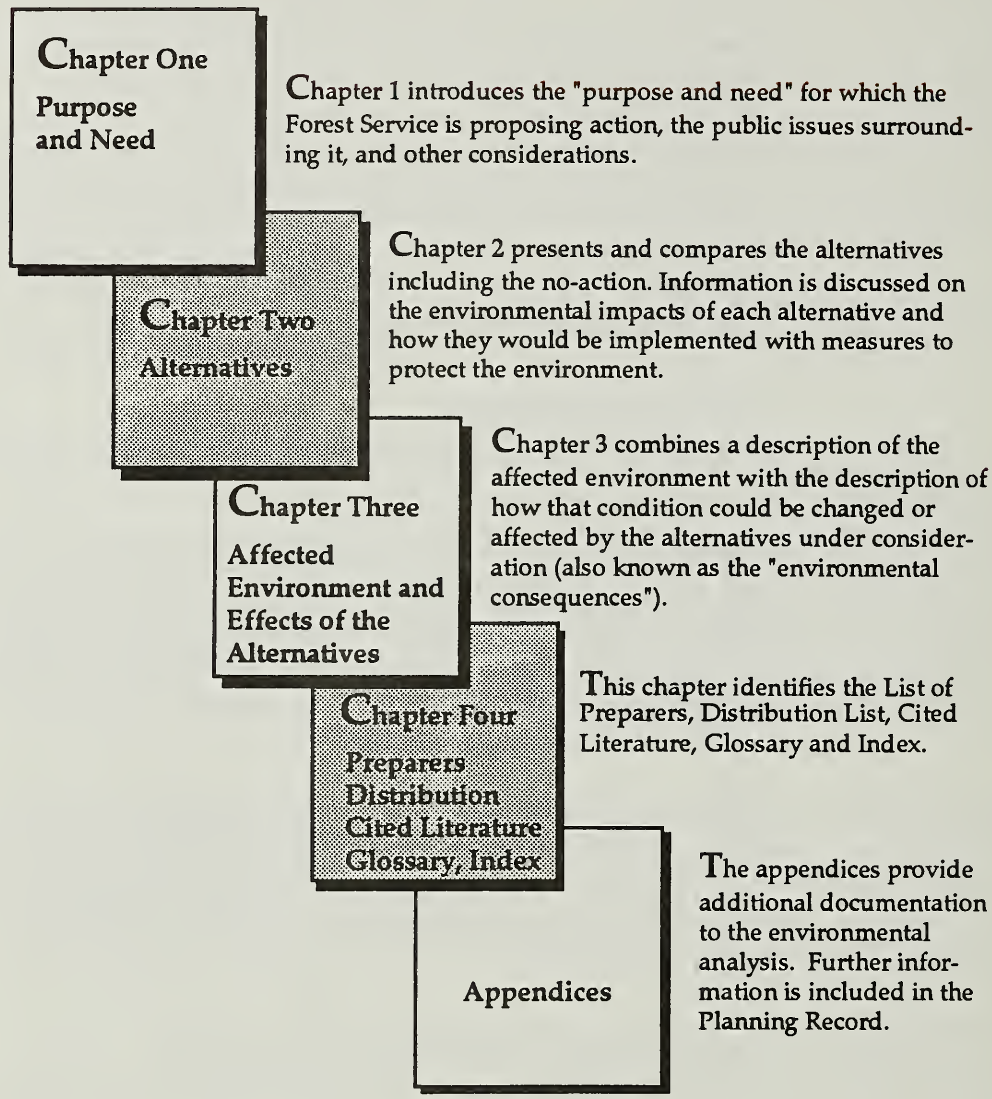
All the alternatives respond to the purpose of and need for action described earlier in this chapter. Detailed maps of proposed alternatives are included in the supplementary map packet. The action alternatives are designed to meet the requirements of the Long-Term Sale Contract and protect affected natural resources, while meeting the objectives and requirements of all relevant laws and higher level Forest Service plans.

Organization of This Document

This EIS follows the format established by the Council on Environmental Quality (CEQ) regulations (40 CFR 1500-1508). The environmental, economic, subsistence, and social consequences of six alternative actions—including a no-action alternative and a no-action/no-harvest alternative—will be disclosed.

The document is divided into four main chapters, as outlined in Figure 1-4. Supporting materials are included in Appendices A-D. Additional supporting materials may be found in the project Planning Record located at the Forest Supervisor's office in Ketchikan.

Figure 1-4
How This Document is Organized



Decision To Be Made

This EIS is not a decision document, but is written to provide sufficient information to form a basis for decision-making. The Forest Supervisor of the Ketchikan Area, Tongass National Forest, will decide whether and when to harvest timber, and how much timber to make available for harvest. The Forest Supervisor can decide to: 1) select one of the alternatives analyzed within the Final EIS, including either of the no-action alternatives; 2) modify an alternative, as long as the environmental consequences of the modified action have been analyzed within the Final EIS; or 3) reject all alternatives. If an alternative is selected, it will be documented in the Record of Decision (ROD).

Relationship to Other Planning Levels

The Central Prince of Wales EIS is part of a hierarchical planning process. The sequence begins with long-range planning at the national level and continues through the regional and forest levels to the project level. Because this EIS is a project level analysis, its scope is confined to issues within the Project Area; that is, it does not attempt to further analyze decisions made in the higher level plans described below.

National Level

The 1990 Program, developed in accordance with the Forest and Rangeland Renewable Resources Planning Act of 1974 (RPA), as amended, provides national direction for the management of national forests and grasslands.

Regional Level

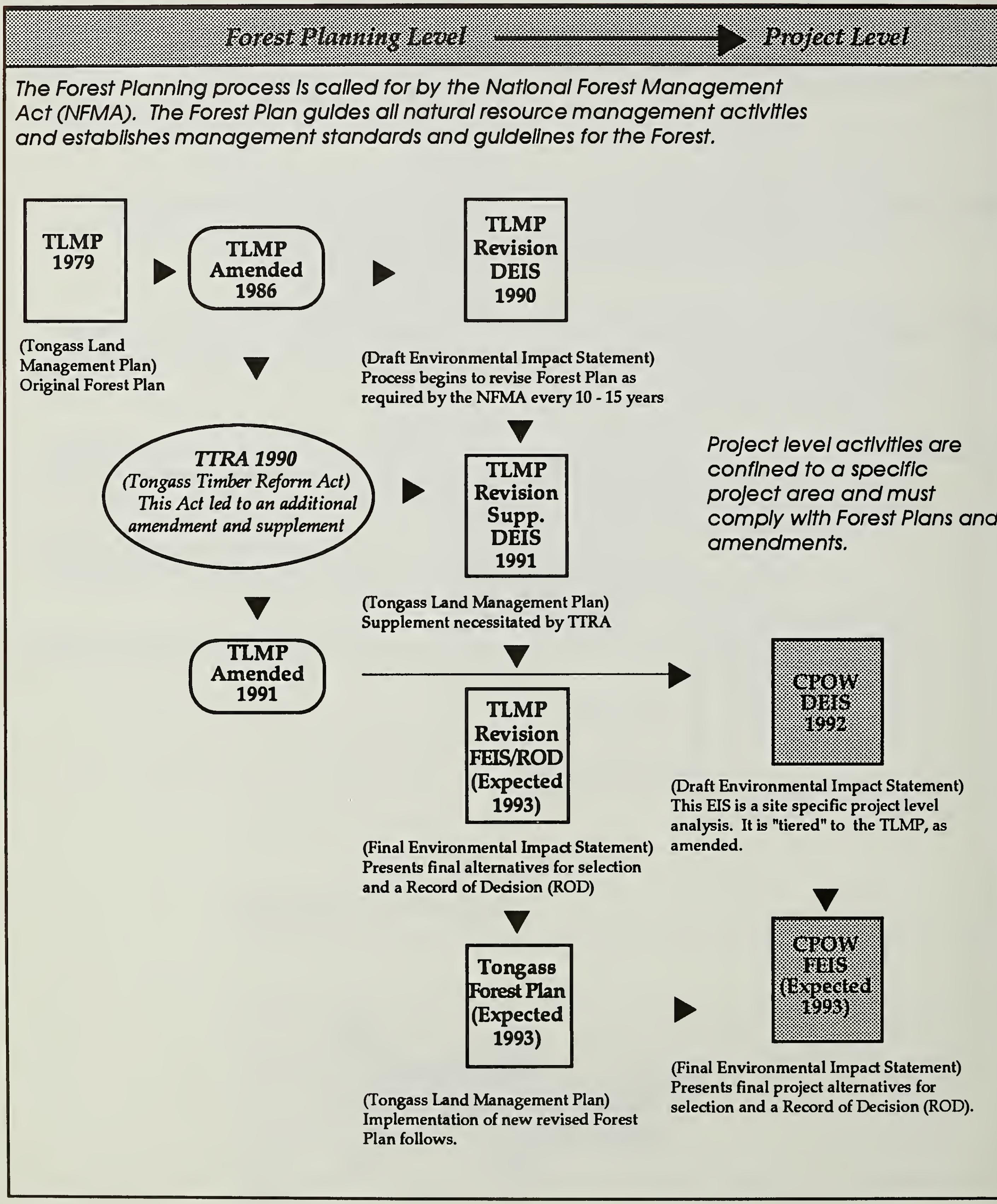
The Alaska Regional Guide (1983) addresses regional issues specific to Alaska, and establishes management standards and guidelines for the Tongass and Chugach national forests.

Forest Level

The National Forest Management Act of 1976 (NFMA) directs each national forest to prepare a land management plan. The Tongass Land Management Plan (TLMP) was completed in 1979 to guide management of the Tongass National Forest. It was amended in 1986 and again in 1991. TLMP is currently undergoing revision, as mandated by the NFMA; a Supplement to the Revision Draft Environmental Impact Statement was issued in 1991 (USDA Forest Service 1991a). Until the Revision is completed, the TLMP as amended remains in effect.

The TLMP process and its relationship to the CPOW project is illustrated in Figure 1-5.

Figure 1-5
Relationship of CPOW EIS to TLMP Planning Documents



Project Level

Other Projects

The 1989-94 Long-Term Sale Contract EIS (LTS EIS) was the most recent EIS addressing the KPC Long-Term Contract on the Project Area. It provided 960 MMBF and harvest units throughout the CPOW Project Area, as well as other areas. Harvesting under this project is nearing completion.

CPOW analyses consider and are coordinated with similar proposed timber harvests north of the Project Area (Lab Bay) and south of the Project Area (Polk Inlet).

Current Project

The CPOW EIS presents a range of alternatives, and displays site-specific descriptions and impacts of the proposed activities in Alternatives 1–5.

The CPOW Draft EIS tiers to the following documents:

• TLMP 1979a, as amended in 1986 and 1991. It also proposes management consistent with the TLMP Revision Supplement Draft EIS, Alternative P (USDA Forest Service 1991a). Documented analyses in TLMP or the TLMP Draft Revision will be referenced rather than repeated in some instances in this EIS.

• The Alaska Regional Guide, 1983.

This Draft EIS adopts the following:

• The Access Management Plan selected in the ROD for the 1989-94 Long-Term Sale EIS (USDA Forest Service 1989).

This Draft EIS makes no new land allocations to provide old-growth habitat conditions or management for visual quality. Such decisions are made by the Forest Plan.

The Interdisciplinary Team (IDT) used a systematic approach to analyze the proposed project, estimate the environmental effects, and prepare this Draft EIS. The planning process complies with the National Environmental Policy Act (NEPA). Planning was coordinated with affected Federal and State agencies.

Land Use Designations

The current TLMP (1979a, as amended) designates areas appropriate for various management activities through four Land Use Designation (LUD) allocations. The proposed TLMP Draft Revision (1991a) would provide more specific management direction by subdividing the Project Area into refined LUD's and by applying specific standards and guidelines. This EIS also utilizes the standards and guidelines presented in the Draft Revision Alternative P (TLMP Draft Revision 1991a).

TLMP, as amended

The CPOW Project Area is allocated to LUD III and IV areas, which are described below. Full definitions of these LUD's and their specific authorized activities are presented in the current TLMP (1979a, as amended).

LUD III

These areas are to be managed for a variety of uses. The emphasis is on managing for both amenity and commodity oriented uses in a compatible manner to provide the greatest combination of benefits. These areas usually have high amenity values in conjunction with high commodity values. Allowances in calculated potential timber yield have been made to meet multiple-use coordination objectives.

LUD IV

These areas are managed to provide opportunities for intensive development of resources. Emphasis is primarily on commodity or market resources and their uses. Amenity values are also considered. When conflicts regarding competing resource uses arise, resolution most often would be in favor of commodity values. Allowances in calculated potential timber yield have been made to provide for protection of physical and biological productivity.

TLMP Revision

TLMP is currently undergoing revision as required by the NFMA, and is expected to be completed before the CPOW Final EIS is published. The TLMP Draft Revision (1991a) describes more specific LUD's, eight of which apply to the CPOW Project Area. Management direction for the Revision LUD's and details of the Management Prescriptions are presented in the TLMP Draft Revision (1991a). For the purposes of the CPOW Draft EIS, references to the TLMP Draft Revision will mean Alternative P of the Revision Supplement to the Draft EIS unless otherwise noted. The TLMP Draft Revision LUD's and other land ownerships allocated in the CPOW Project Area are described below and presented in Table 1-1.

Alaska State Lands (AK)

Lands belonging to the State of Alaska.

Modified Landscape (ML)

The objective of this LUD is to provide a mix of management options, while minimizing the visibility of development activities in the foreground, and allowing more development in the middle and background distances. The desired future condition is that of a multi-aged forest landscape where activities are designed to borrow from, and relate to, features found in the characteristic landscape.

Other Areas (OA)

The emphasis of this LUD is the stewardship and protection of lands for which there is no other specific land use emphasis. These lands may be rock, ice, muskeg, brush, grass, and forested lands classified as unsuitable for timber production. Most often, they will be managed in their existing natural condition.

Private (PV)

Privately owned lands.

Tongass Land Management Plan (TLMP)

TLMP, as Amended
The original TLMP of 1979 was amended in 1986 and 1991. TLMP, as amended, refers to the 1991 amendment in this document.

TLMP, Revision
As required by NFMA, the TLMP Revision Draft EIS was completed in 1990. Necessitated by TTRA, a Supplement to the revision was completed in 1991. This document references the TLMP Revision Supplement of 1991.

This EIS is tiered to the TLMP, as amended in 1991, and will manage consistent with the TLMP Revision Supplement Draft EIS, 1991.

Recreation River (RR)

The emphasis of this LUD is to maintain, improve, and protect the essentially free-flowing character and outstandingly remarkable values which qualify the river to be considered eligible for inclusion in the National Wild and Scenic River system as a Recreational River. The area may include landscapes in a variety of visual conditions.

Scenic River (SR)

The emphasis of this LUD is to maintain, enhance and protect the free-flowing character and the outstandingly remarkable values of river segments which qualify the river to be considered eligible for inclusion in the National Wild and Scenic River system as a Scenic River. These areas may provide recreation opportunities which meet high expectations for scenic quality associated with an essentially natural-appearing environment and a free-flowing river.

Scenic Viewshed (SV)

The emphasis of this LUD is to provide scenic landscapes, vistas, and travel corridors in areas viewed from roads used primarily for recreational driving, trails, major marine travel routes, recreation sites, and popular bays and anchorages where forest visitors have high expectations for scenic quality. Recreation facilities may be present. This LUD may include landscapes that have been modified in the past, but future management will focus on restoring and maintaining scenic quality.

Timber Production (TP)

The emphasis of this land use designation is for timber production. The primary objective is to manage the area, using silvicultural techniques, to maintain and promote industrial wood production. These lands will be managed to advance conditions favorable for the development of the timber resource and for maximum long-term timber production.

Beach Fringe and Estuary (BF)

The emphasis of this land use designation is to manage natural beach fringe and estuary habitats to favor wildlife, fish, recreation, visual and other resources associated with beach fringe and estuary areas. Habitats for shorebirds, waterfowl, bald eagles, and other marine-associated species are emphasized. Areas allocated to this land use designation are incorporated into several other categories and are not presented separately in Table 1-1.

Stream and Lake Protection (SL)

The emphasis of this land use designation is to maintain riparian habitat for fish and other riparian-associated resources. This prescription applies to areas comprised of aquatic and riparian ecosystems, including riparian streamsides, lakes, and floodplains, as well as the zones of interaction between the riparian and upland terrestrial ecosystems. Conflicts in management activities are settled in favor of the riparian-associated fish and wildlife species. Areas allocated to this land use designation are incorporated into several other categories and are not presented separately in Table 1-1.

CPOW Project Area LUD's

The CPOW Project Area encompasses all or part of five management areas, as shown on Fig. 1-2. Table 1-1 presents CPOW Project Area Management Areas, VCU's, LUD's (both TLMP and TLMP Draft Revision), and corresponding acres.

Table 1-1
Management Areas, Value Comparison Units (VCU's), and LUD's

		TLMP LUD*		Draft Revision LUD (Alt.P)** Percent of VCU***								Total MA Acres in
MA	VCU	LUD	Acres	AK	ML	OA	PV	RR	SR	SV	TP	CPOW
K03	549.2	IV	6,909		4,768					345	1,796	
	550	IV	10,630		4,571					106	5,953	
	551	III	5,232		4,029					1,046	157	
												22,771
K07	554.2	IV	8,873		1,952			532		1,242	5,147	
	557	IV	3,141							346	2,795	
	571	IV	16,613								16,613	
	587.1	IV	7,842							1,568	6,274	
	588	IV	26,634		799					4,528	21,307	
	589	IV	20,028		1,602						18,426	
	590	IV	13,786								13,786	
												96,917
K08	552	III	8,165		3,103				1,796	3,266		
	553	IV	7,520		150						7,370	
	573	III	26,008		8,959				6,936	9,824	289	
	574	III	13,659		1,502				3,415	8,469	273	
	577	IV	13,625						136	818	12,671	
												68,977
K09	572	IV	7,604	1,673	76					2,129	3,726	
	579	IV	10,710		3,320					107	7,283	
	580	IV	15,393			3,848				154	11,391	
	581	IV	20,008		7,803					1,200	11,005	
	582	III	4,014		120					.3,774	120	
	583	IV	12,242		5,754	122				612	5,754	
	584	III	13,476		5,795					7,546	135	
	585	IV	10,439		3,132					104	7,203	
												93,886
K10	586	III	15,282	5,043	6,265			1,223		2,598	153	
	598	IV	12,929	388	129						12,412	
	599	IV	6,363	2,736	1,845					1,782		
	600	IV	3,213		129					3,084		
	601	IV	1,343	658			81				604	
												39,130

*September 1990. Private and state lands are incorporated within the LUD categories. SOURCE: Ketchikan Area GIS data base.
**April 29, 1991. AK=State land ML=Modified Landscape OA=Other Area PV=Private land RR=Recreation River SR=Scenic River SV=Scenic Viewshed TP=Timber Production WR=Wild River. Additional acres of Stream and Lake Protection LUD and Beach Fringe LUD are incorporated within these categories. See TLMP Draft Revision (1991a) for map of each area.
***Includes only that portion of the VCU within the Project Area.

Why the CPOW Project Area was Selected

This section explains the modifications to the Long-Term Contract and other management considerations that influenced the schedule of environmental analyses for the Ketchikan Area. CPOW is one of several existing projects. See Appendix A for the full rationale supporting the following discussion.

Background to the Long-Term Contract

In 1951, the Forest Service and KPC signed an agreement entering into a Long-Term Timber Sale Contract (Long-Term Contract) to harvest approximately 8.25 BBF, valid for the period 1954 to 2004. In response to the post-war boom, Japanese interest in Alaska timber, and the desire to establish a stable industry in Southeast Alaska, Congress authorized the Forest Service to develop this Long-Term Contract and others, for a total supply of nearly 23 BBF of timber over the life of the contracts.

Portions of the Ketchikan Area were allocated as the Primary Sale Area. While the Long-Term Contract was not restricted to harvesting timber within the Primary Sale Area alone, the Primary Sale Area was specifically set aside for use by KPC under the Long-Term Sale. The Long-Term Contract was divided into five-year appraisal periods in the mid-1960's, and required redetermination of payment rates every five years. In conjunction with rate redetermination, an operating plan was developed which described the timber harvest and associated activities that would take place during the upcoming five-year period.

On November 28, 1990, President Bush signed into law the Tongass Timber Reform Act (TTRA). Among other provisions, Section 301 of this Act imposed unilateral changes to the Long-Term Contract with KPC to make it more consistent with independent National Forest timber sale programs. Consistent with unilateral changes resulting from TTRA that became effective in February 1991, timber now is made available for harvest from smaller timber offering areas. This is in contrast to preparing a single EIS for the entire contract area, as was the case for the five-year appraisal periods. Management requirements and the NEPA planning process are to be consistent with those for the independent timber sale program. (TTRA 301(c)(1))

The Long-Term Contract between the USDA Forest Service and KPC expires June 30, 2004. As of October 1, 1991, the Forest Service is obligated to provide KPC with an additional 2.6 BBF to meet contractual commitments. This equates to approximately 205 MMBF per year until the expiration date.

Offerings specified after February 1991 must comply with the requirements of Tongass Timber Reform Act (TTRA), including proportionality, streamside buffers, and other provisions.

KPC Contract Modifications Resulting from TTRA

The TTRA requires the Forest Service to follow a planning and environmental analysis process consistent with independent National Forest timber sales. Timber will be provided within the contract boundary in designated "timber offering areas." Offering areas may vary in size, largely depending on logical transportation systems and the amount of timber necessary to meet contract requirements. Offering areas are to be managed like independent timber sale areas.

These timber offerings will be based on volume needed to meet contractual obligations stated in B0.52, B0.61, and B0.62 of the amended KPC contract (1951, amended February 1991). In part, B0.62 says the “Forest Service shall seek to specify sufficient Offerings to maintain a Current Timber Supply in all Offering Areas that totals at least three years of operations.” This translates to approximately 615 MMBF for three years of normal timber stock; this amount is designed to allow KPC to schedule the flow of raw materials to their processing facilities.

Under KPC contract provision B0.31-Additional Areas, “the Regional Forester shall designate additional cutting areas within Pulptimber Allotments E, F, and G to meet such needs of such plants for the period ending June 30, 2004.” The preferred alternative in the TLMP Draft Revision (1991a) indicated that both the Primary Sale Area and the contingency areas would be needed to meet the timber volume contractual obligations. A tentative operating schedule was developed and approved for implementation based on this analysis (see Appendix A). Areas within the KPC Primary Sale Area boundary are scheduled first, while the area outside the Primary Sale Area boundary is scheduled later as required under contract provision B0.31. Virtually every VCU that is in a LUD III or IV area (permitting timber harvesting) is scheduled to be harvested to some extent within the next 12 years to meet the needs of the KPC Long-Term Contract and independent timber purchasers.

On June 19, 1992, the USDA Forest Service Region 10 Regional Forester supplemented the original delegation of authority letter for the KPC Contract for administration of this contract as follows:

“FSM 2402.21 Item 5 states ’A line officer may approve multi-sale decision documents prepared in compliance with NEPA and Council on Environmental Quality regulations at 40 CFR Parts 1500-1508, provided that the line officer has authority to approve each of the timber sales included in the multi-sale decision (40 CFR 1508.25).’ The Forest Supervisor is authorized to approve operation plans and NEPA decision documents for individual Offerings within the guidelines outlined in FSM 2402.21 Item 5. This authority may not be redelegated, except to a successor or to an Acting Forest Supervisor.”

As a result of this delegation of authority, the Forest Supervisor of the Ketchikan Area is now the responsible official for this Environmental Impact Statement.

Summary

In summary, the CPOW Project Area was selected for environmental analysis at this time for the following reasons:

- The CPOW Project Area is within the designated Primary Sale Area for the KPC Long-Term Contract, and contains a sufficient amount of harvestable timber volume designated as LUD III or IV, and therefore is appropriate for harvest under the TLMP (1979a, as amended). Available information indicates that harvest of the amount of timber being considered for this project can occur consistent with Forest Plan (TLMP 1979a as amended, and TLMP Draft Revision 1991a) standards, guidelines, and other requirements for resource protection. Consideration of areas outside the designated sale area at this time would not meet KPC requirements and is otherwise not necessary or reasonable.

- Other areas with available timber inside the designated sale area will be necessary for harvest within the remainder of the KPC contract term (by 2004) in order to meet contract volume requirements. Effects on subsistence resources are projected

to differ little according to which sequence these areas are subjected to harvest. Harvesting other areas on the Tongass National Forest with available timber is expected to have similar potential effects on resources, including those used for subsistence, because of widespread distribution of subsistence use and other factors. Harvest of these other areas is foreseeable, in any case, over the forest planning horizon under either the existing or draft revised Forest Plan.

There are four EIS's currently underway which comprise virtually all of the Primary Sale Area in the Ketchikan Area. A fifth project was completed in 1991, but is scheduled for harvest by independent timber purchasers. These are listed below and presented in Figure 1-6.

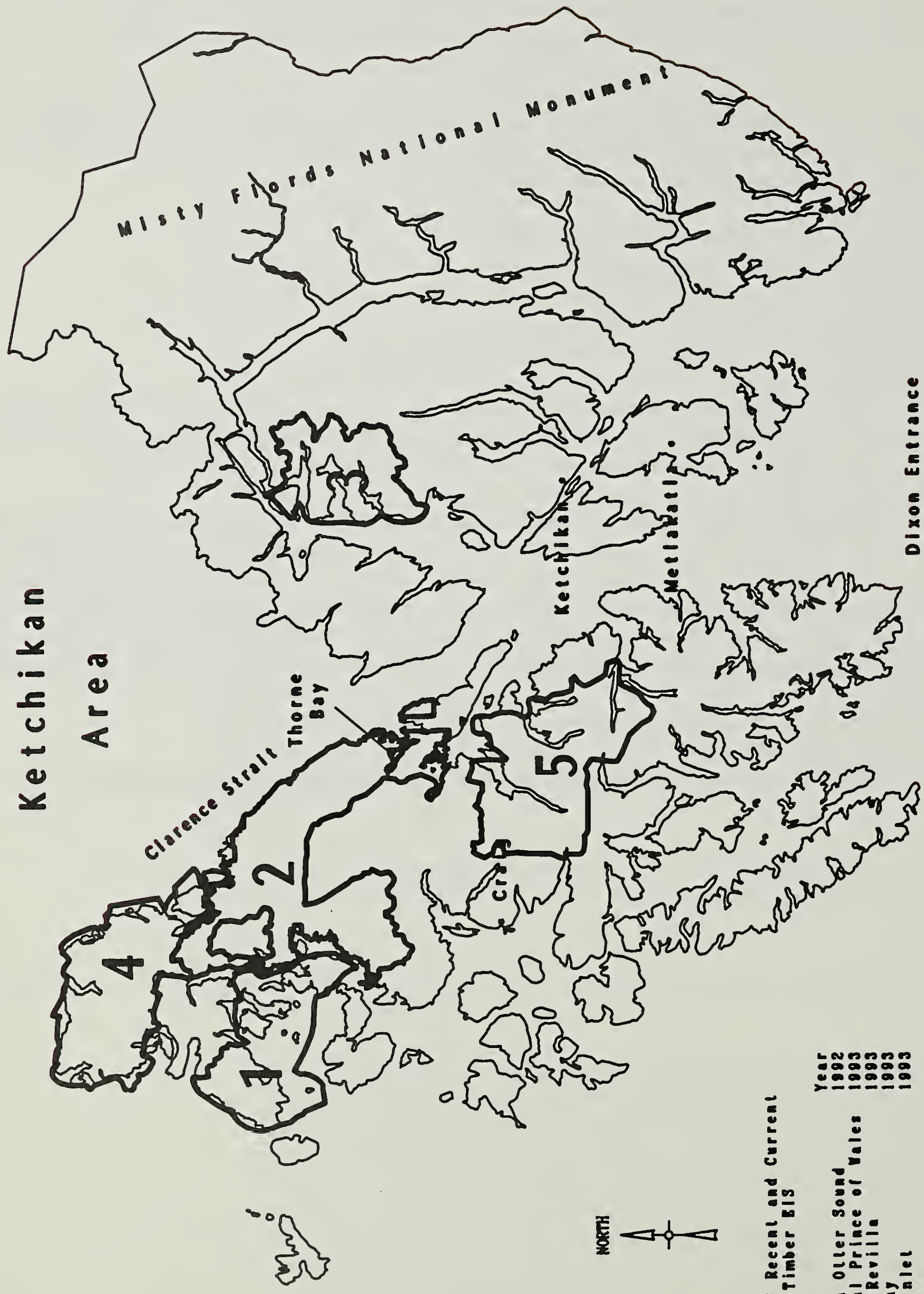
- Central Prince of Wales EIS
- North Revilla EIS
- Polk Inlet EIS
- Lab Bay EIS
- North Sea Otter Sound ROD

- Providing substantially less timber volume than required by the KPC contract in order to avoid harvest in the CPOW Project Area or other project areas would not meet contract requirements and is otherwise not necessary or reasonable.

- It is reasonable to schedule harvest in the CPOW Project Area at present rather than in other areas in terms of previous harvest entry and access, level of controversy over subsistence and other effects, and the ability to complete the NEPA process and make timber available to meet contract requirements by the time it is reasonably necessary to do so. Other areas that are reasonable to consider for harvest in the near future are the subject of other project EIS's that are currently ongoing or scheduled to begin soon.

For further details on why the CPOW area was selected, see Appendix A.

Figure 1-6
Recent and Current Primary Sale Area EIS Projects



Public Involvement

The NEPA scoping process (40 CFR 1501.7) was used to invite public participation and to determine the scope of this project, including the issues to be addressed. The Forest Service sought information, comments, and assistance from Federal, State, and local agencies, and from other groups and individuals interested in or affected by the proposed action. The following steps were included in the public scoping process:

- **Public Mailing**. On August 15, 1991, a letter seeking public comment was mailed to approximately 2,100 groups and individuals who had previously shown interest in Forest Service projects in Southeast Alaska. The mailing included 8 Federal agencies, 18 State agencies and divisions, 67 Native and municipal offices, and 213 businesses, local Fish and Game advisory committees and other organizations and groups, in addition to individual citizens. Of the 100 responses to this mailing, 68 had no comments but wished only to remain on the mailing list.

- **Notice of Intent (NOI)**. A Notice of Intent was published in the Federal Register on August 30, 1991.

- **Local News Media for Scoping**. A scoping document with project map was placed in the September 7, 1991, weekend edition of the *Ketchikan Daily News*, and in the *Island News*. A press conference was held October 17, 1991, to discuss current planning projects on the Ketchikan Area of the Tongass National Forest, including the Central Prince of Wales EIS.

- **Second Public Mailing**. On March 23, 1992, a second mailing was sent to 376 names, including those who responded to the first mailing or who later asked to be placed on the mailing list, plus additional individuals, organizations, and agencies. This letter summarized the significant issues derived from the initial public comments, outlined the tentative alternatives to be analyzed in the Draft EIS, and invited public attendance at scoping feedback meetings described below.

- **Scoping Feedback Meetings**. Meetings were held in April 1992 to disclose the tentative alternatives and to answer questions from the public. The following meetings were held: April 6, with representatives of the Alaska Department of Fish and Game (ADF&G); April 7, with representatives of Ketchikan Pulp Company (KPC); April 8, with the public at Thorne Bay, Prince of Wales Island; April 9, with the public at Ketchikan; April 10, at Craig, Prince of Wales Island, with representatives of the following conservation organizations: Southeast Alaska Conservation Council (SEACC), Greenpeace, Prince of Wales Conservation League, Alaskans for Responsible Resource Management.

  Legal notices announcing the Ketchikan public meeting and the Thorne Bay public meeting were placed in the *Ketchikan Daily News* and the *Island News*; public service announcements and news releases were sent to radio stations and newspapers in Ketchikan, Thorne Bay, Wrangell, and Petersburg. A radio interview with CPOW IDT Leader Bill Shoaf discussing the project and the upcoming public meetings was broadcast on KRBD-FM, Ketchikan, April 2 and 3.

- **Third Public Mailing**. A letter was sent to approximately 2,100 names on June 5, 1992, providing an opportunity for people to indicate how they would like to

continue participation in the CPOW planning process. The mailing list consisted of the original list amended by responses to the first mailing and subsequent public meetings. Responses to this third mailing became the basis for the Distribution List used to mail copies or summaries of the Draft EIS as requested. The Distribution List is found in Chapter 4 of this document.

- **Briefings**. Additional briefings were held in July and August 1992 with representatives of Ketchikan Pulp Company, Alaska Department of Fish and Game, Tongass Conservation Society, Southeast Alaska Conservation Coalition, and Greenpeace.

- **Upcoming Public Involvement Opportunities**. Upon the release of the Draft EIS in fall 1992, public announcements will be made via radio and newspaper and a news conference. Notice will be placed in the Federal Register, followed by a 45-day comment period for receipt of public comments. Copies of complete Draft EIS documents or summaries will be sent to the Distribution List.

  - Subsistence Hearings will be held in late fall/early winter 1992, and comments will be recorded. Open houses to describe the analysis process and answer public questions will be held in conjunction with the subsistence hearings. Dates and locations are announced in the cover letter accompanying this document.

  - Public comments and subsistence comments will be analyzed and incorporated into the Final EIS upon the close of the public comment period for the Draft EIS.

  - The Final EIS is scheduled to be released in April 1993, and the Forest Supervisor will issue a Record of Decision (ROD) at that time.

Copies of the legal notices and newspaper articles, as well as comments received, are included in the project Planning Record.

Issues Associated with the Proposed Action

The significant issues, concerns, and management opportunities identified through the public and internal scoping process were used to formulate issue statements. Some of these issues were raised by the public, and some reflect Forest Service concerns about specific resources and legal requirements to meet key TLMP standards. Similar concerns were grouped when appropriate.

Issues 1-6 were determined to be significant issues within the scope of the project. Every alternative addresses all of these issues to varying degrees. Issues 7-12 were considered but eliminated from detailed study because their resolution falls outside the scope of the CPOW project.

Significant Issues Within the Scope of the Project

1. Cost effectiveness of timber harvest operations

This issue focuses on the economics of timber harvest while protecting resource values.

Examples of public concerns included:
- whether logging and road construction costs would preclude an economical timber harvest for KPC.
- whether cost-effective harvesting methods would be planned for, specifically minimizing or eliminating expensive systems such as helicopter yarding.
- whether economical timber harvest would cause excessive harvest of volume class 6 and 7 timber types, and thereby exceed requirements for timber proportionality as mandated by TTRA.
- whether design of timber harvest units would include consideration of alternate harvest methods to clearcutting.

Key indicators for evaluating the cost-effectiveness of timber harvest include: proportionality analysis, amount of helicopter yarding, timber volume per mile of new road construction, mid-market timber analysis, timber volume per acre, costs of new roads and facilities.

2. Impact of timber harvest on subsistence use

The Alaska National Interest Lands Conservation Act (ANILCA) specifically requires the Forest Service to determine if proposed activities may significantly restrict subsistence use. This issue focuses on the impact of the proposed action on the availability of wildlife, marine life, and plants for customary and traditional use by rural Alaskan residents.

Examples of public concerns included:
- whether cumulative effects of more timber harvest on National Forest lands and Native owned lands would displace subsistence users from traditional areas.
- whether critical deer winter habitat near communities, especially the Sandy Beach area, would be adversely affected by timber harvest operations.
- whether access provided by new road construction would open new areas to subsistence users.

Key indicators for evaluating the impacts of timber harvest on subsistence use include: acres of high subsistence use areas harvested; short- and long-term effects on deer habitat capability as it affects abundance and distribution.

3. Impact of timber harvest operations on wildlife habitat

Alaskan wildlife are valuable for aesthetic, economic, ecological, recreational, and subsistence reasons. This issue focuses on the impacts of timber harvest and associated road construction upon wildlife species, particularly those closely associated with landscape-sized tracts of old-growth habitat.

Examples of public concerns included:
- whether additional timber harvest would cause an overall decline in wildlife populations and biological diversity.
- whether timber harvest operations would further fragment existing old-growth habitat.

- whether road construction and management policy would increase disturbance of wildlife.
- whether timber harvest would have an impact on critical deer winter habitat, especially along the beach fringe.
- whether additional timber harvest along Sandy Beach would endanger population viability of marten and deer in that area.
- whether important wintering trumpeter swan habitat would be affected by timber harvest.
- that the proposed action should be evaluated in light of a long-term wildlife conservation strategy, which should be developed.

Key indicators for evaluating the impacts of timber harvest on wildlife and wildlife habitat include: impacts on habitat capability of Management Indicator Species, as predicted by computer models; acres of wildlife habitat harvested. Forest Plan standards and guidelines are assumed to be in effect.

Figure 1-7 identifies the approximate areas of large unfragmented blocks of old growth containing high value wildlife habitat (as defined by ADF&G and Forest Service biologists) analyzed in this EIS.

4. Impact of timber harvest operations within Honker Divide

The Honker Divide area contains high value habitat for fish and wildlife (as defined by ADF&G and Forest Service biologists), as well as recreation opportunities, including a primitive canoe route unique to the region. Parts of the Thorne River–Hatchery Creek system and associated watersheds within this area are recommended by the TLMP Draft Revision, Alternative P, (1991a) for designation as Scenic or Recreation rivers under the Wild and Scenic Rivers Act. A map of the eligible Scenic/Recreation River corridors in the Project Area is located in Chapter 3-Recreation.

The exact boundaries of the area known as Honker Divide are not clearly defined or universally accepted. This project defines Honker Divide as including all land drained by the Thorne River-Hatchery Creek system, from Barnes Lake to the Thorne River Bridge. This includes all or portions of VCU's 552, 573, 574, 575, 576 (south), 577 (east), 578, 596, and 597. This issue focuses on the impact of timber harvest operations on the wildlife and recreational values of Honker Divide and other areas of special concern.

Figure 1-7 (previously discussed) includes the approximate area used to define Honker Divide in the EIS, the canoe route, and the large unfragmented blocks of old growth as discussed above.

Examples of public concerns included:
- whether timber harvest and road construction would decrease recreational opportunities in Honker Divide.
- whether timber harvest and road construction would decrease wildlife and fishery values in this area.
- whether visual quality along the canoe route and the proposed Scenic/Recreation River corridor would be adversely affected by timber harvest and roads.
- whether Honker Divide should be managed primarily for recreational opportunity, primitive recreation, primitive canoe access, recreation and tourism values.

Key indicators for evaluating the impacts of timber harvest within Honker Divide include: acres harvested within Honker Divide; acres harvested within the large, unfragmented blocks of old growth in Honker Divide; acres harvested that are visible from the canoe route.

5. Impact of timber harvest operations on fish habitat and water quality

Anadromous and resident fish are important to sport, commercial, and subsistence users throughout Southeast Alaska. The communities of Thorne Bay and Coffman Cove have municipal water supplies that depend on watersheds within the Project Area for their domestic water source. This issue focuses on the concern for protecting water quality in streams which provide habitat for anadromous and resident fish and which supply water to local communities.

Examples of public concerns included:
- whether timber harvest and road building activities would impair salmon reproduction and survival, especially in the Ratz, Eagle, Hatchery, and Thorne stream systems.
- whether streamside buffers will be provided.
- whether the project would cause deterioration of soil and water quality.
- whether timber harvest operations would affect subsurface water drainages and caves.

Key indicators for evaluating the impacts of timber harvest activities on fish habitat and water quality include: impacts on habitat capability for Management Indicator Species, as predicted by computer models; units with fishery concerns; roads with construction timing requirements; number of stream crossings; harvest of Mass Movement Index (MMI) soils; acres of karst (potential caves) within proposed harvest units. It is assumed that all relevant BMP's and Forest Plan standards and guidelines are in effect.

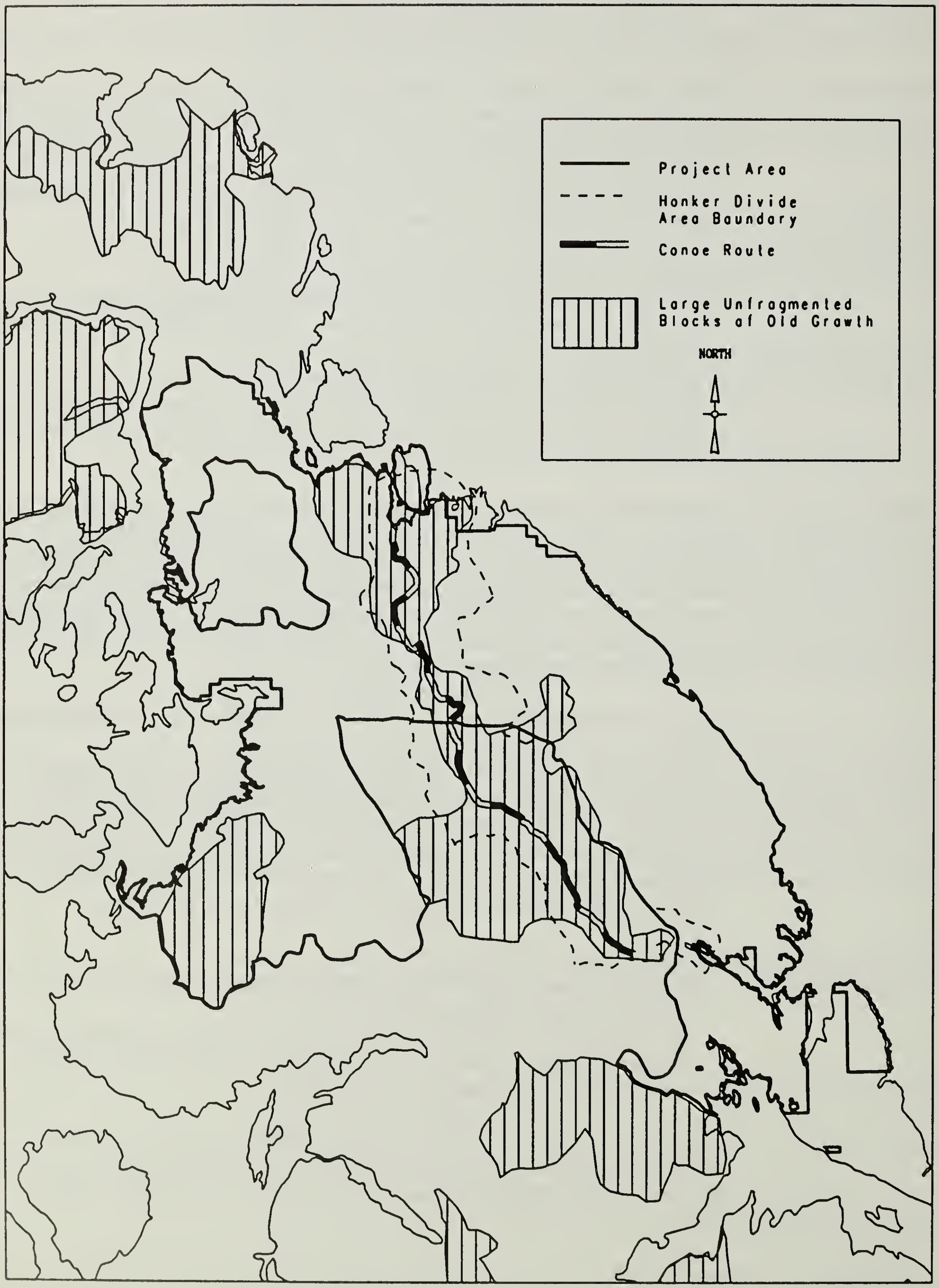
6. Impact of timber harvest operations on visual quality and recreation

Southeast Alaska's attractive setting is a major focus for a wide range of recreational uses of the region. Prince of Wales Island contains many of the region's outstanding scenic features, and is unique in that recreational opportunities are more accessible by road than elsewhere in Southeast Alaska. This issue focuses on how timber harvest and road-building activities would affect recreation opportunities and the visual character of the landscape.

Examples of public concerns included:
- whether the scenic backdrop from Maurelle Island Wilderness Area would be affected by timber harvest activities.
- whether important landscape viewing points would be adequately identified.
- whether increased subsistence use would lead to increased competition with sport hunting and fishing.

Key indicators for evaluating the impacts of timber harvest activities on CPOW's visual and recreational resources include: changes in Recreation Opportunity Spectrum (ROS); harvest of roadless areas; harvest in recreation places.

Figure 1-7
Large Unfragmented Blocks of Old Growth Habitat, and Honker Divide



Issues Outside the Scope of this Analysis

The following public issues were considered but eliminated from detailed study because their resolution is beyond the scope of this document.

7. **Future economic and social stability for regional communities should be provided for.**

   Long-term economic and social considerations are Forest Plan issues and are dealt with under the TLMP Revision process. However, impacts of the proposed actions on the current social and economic environment of the affected area are analyzed in the CPOW Draft EIS.

8. **TLMP Land Use Designations should be changed to eliminate or reduce the level of harvest and/or maximize specific resources such as Honker Divide.**

   Land use allocation is a Forest Plan issue. The current revision to TLMP provides a forum for people who wish to see the area managed in a manner that differs from the current direction.

9. **CPOW should be delayed until after TLMP revision is complete.**

   In anticipation of the TLMP Revision, alternatives in this EIS have been developed which are consistent with the standards and guidelines from Alternative P of the TLMP Draft Revision (USDA Forest Service 1991a). Management activities proposed under the alternatives in this EIS are consistent with standards and guidelines of the TLMP Draft Revision. The Forest Plan Revision is expected to be completed before the CPOW Final EIS is released.

10. **The proposal should increase the Allowable Sale Quantity (ASQ).**

    Setting the ASQ is a Forest Plan issue and not within the scope of this project.

11. **Below-cost timber sales should be eliminated.**

    Below-cost sales is a national issue and not within the scope of this project. The financial impacts of the alternatives, based on a mid-market analysis, are displayed in Chapter 3 in this EIS.

12. **Regional timber supply and demand should be refigured for the CPOW Project Area.**

    Timber supply and demand is a regional issue and exceeds the scope of this analysis. A site-specific environmental analysis documents the effects of the proposed activities; it does not constitute the selling or conveyance of property rights. The volume of timber analyzed in any NEPA document may be offered (sold) in part, in whole, or not at all.

    The timber offered for sale (timber offerings) may occur in one year or be spread over a three- to five-year period. Therefore, trying to predict the effects of the proposed activities upon the regional timber supply or demand is beyond the capability and scope of this document.

Federal and State Permits and Licenses

To proceed with the timber harvest as addressed in this EIS, various permits must be obtained from other Federal and State agencies. Administrative actions on these permits, as needed, would be initiated 30 days after the Draft EIS is filed with the Environmental Protection Agency (EPA). The agencies and their responsibilities are listed below.

U.S. Army Corps of Engineers
* Approval of discharge of dredged or fill material into waters of the United States (Section 404 of the Clean Water Act of 1977, as amended).
* Approval of construction of structures or work in navigable waters of the United States (Section 10 of the Rivers and Harbors Act of 1899).

U.S. Environmental Protection Agency
* National Pollutant Discharge Elimination System review (Section 402 of the Clean Water Act of 1977, as amended).

State of Alaska, Department of Natural Resources
* Authorization for occupancy and use of tidelands and submerged lands.

State of Alaska, Department of Environmental Conservation
* Certification of compliance with Alaska Water Quality Standards (Section 401 Certification).
* Solid Waste Disposal Permit (Section 402 of Clean Water Act of 1977, as amended).

U.S. Coast Guard
* Coast Guard Bridge Permit (in accordance with the General Bridge Act of 1946) required for all structures constructed across navigable waters of the United States.

Legislation and Executive Orders Related to This EIS

Shown below is a brief list of laws pertaining to preparation of EIS's on Federal lands. Some of these laws are specific to Alaska, while others pertain to all Federal lands.

National Historic Preservation Act of 1966 (as amended)
Wild and Scenic Rivers Act of 1968
National Environmental Policy Act (NEPA) of 1969 (as amended)
Clean Air Act of 1970 (as amended)
Alaska Native Claims Settlement Act (ANCSA) of 1971
Marine Mammal Protection Act of 1972
Endangered Species Act (ESA) of 1973 (as amended)
Forest and Rangeland Renewable Resources Planning Act of 1974 (as amended)
National Forest Management Act (NFMA) of 1976 (as amended)
Clean Water Act of 1977 (as amended)
American Indian Religious Freedom Act of 1978
Alaska National Interest Lands Conservation Act (ANILCA) of 1980
Archeological Resource Protection Act of 1980

Tongass Timber Reform Act (TTRA) of 1990
Executive Order 11988 (floodplains)
Executive Order 11990 (wetlands)
Cave Resource Protection Act of 1988

Coastal Zone Management Act. In addition to the above laws, the Coastal Zone Management Act (CZMA) of 1976, as amended, pertains to the preparation of an EIS. Federal lands are not included in the definition of the Coastal Zone as prescribed in CZMA. However, the Act requires that when Federal agencies conduct activities or development that affects the Coastal Zone, that agency's activities or development must be consistent to the maximum extent practicable with the approved State Coastal Management Program.

The Alaska Coastal Management Plan incorporated the Alaska Forest Resources and Practices Act of 1979 as applied standards and guidelines for timber harvesting and processing. The Forest Service Standards and Guidelines and Mitigation Measures described in Chapter 2 of this document are fully consistent with the State Standards.

Availability of Planning Record

An important consideration in preparation of this EIS has been reduction of paperwork as specified in 40 CFR 1500.4 (CEQ 1986). In general, the objective is to furnish enough site-specific information to demonstrate a reasoned consideration of the environmental impacts of the alternatives and how these impacts can be mitigated, without repeating detailed analyses and background information readily available elsewhere.

The Planning Record documenting the process of producing this EIS is available at the Forest Supervisor's office, Ketchikan, Alaska, upon the issuance of the Draft EIS. Other referenced documents such as the Tongass Land Management Plan, the Tongass Timber Reform Act, the Resources Planning Act, and the Alaska Regional Guide, are available at public libraries around the region as well as at the Supervisor's Office in Ketchikan.

Chapter Two

The Alternatives

Chapter 2

Alternatives

Key Terms

Aquatic Habitat Management Unit (AHMU) - area for managing the resources associated with streams and lakes
Alternative - one of several policies, plans, or projects proposed for decision making
BMP's - Best Management Practices - practices used for the protection of water quality
Implementation monitoring - collecting information to evaluate whether mitigation measures were carried out in the manner called for
MELP - Multi Entry Layout Plan - interdisciplinary design and mapping of all potential timber harvest units, including associated logging and transportation systems
Mitigation - measures designed to counteract or lessen environmental impacts
MMBF - a million board feet
Partial cut - harvest of timber using silvicultural prescription other than clearcut; examples include shelterwood, seed tree, and group selection
Remain-open temporary road - a road that is maintained useable for a short period of time after timber harvest, and closed after use with bridges and culverts removed
Roadless area - an area of undeveloped public land identified by the TLMP Draft Revision
Specified road - road built for long-term management of the forest as part of a timber sale contract
Subsistence - the customary and traditional uses by rural Alaskan residents of wild renewable resources for direct personal or family consumption
Temporary road - constructed to harvest timber on a one-time basis; closed to vehicular traffic upon completion of timber harvest
Windfirm - configuration of harvest units so as not to create an opening which exposes the adjacent stand of timber to the direction of the major prevailing storm wind (southeast)

Introduction

Chapter Two summarizes the development of alternative actions for making timber available to the Ketchikan Pulp Company (KPC), while implementing the Tongass Land Management Plan (TLMP) Revision in the CPOW Project Area. It also discusses the alternatives considered but eliminated from detailed study. Finally this

chapter explains and compares the five alternative actions selected for detailed study. Chapter 2 is intended to provide the decision-maker with a clear basis for choice.

Much of the information in Chapter 2 is summarized from Chapter 3, Environment and Effects. Chapter 3 contains the detailed scientific basis for establishing a baseline and measuring the environmental consequences for each of the alternatives. For the best understanding of the five alternatives, readers should consult Chapter 3.

Alternative Development

Each action alternative presented in this EIS is a different response to the significant issues discussed in Chapter 1. For this EIS, four action alternatives were developed to meet the stated purpose and need of the project, while minimizing or avoiding environmental impacts. Each action alternative represents a site-specific proposal developed through intensive interdisciplinary unit and road design using high resolution topographic maps, GIS mapping capabilities, and new 1991 aerial photos (see Appendix C).

Initial scoping for the CPOW project began in September 1991. The results of scoping were used to finalize the significant issues described in detail in Chapter 1. In early December 1991, the Interdisciplinary Team (IDT) reviewed each significant issue and summarized all associated public comments. This review led to development of ranges of solutions for each issue, which became the emphases for alternate ways to design and disperse timber harvest activities throughout the Project Area to meet the stated purpose and need of CPOW.

Each action alternative was designed to respond specifically to the significant issues to various degrees. Additionally, each action alternative would meet, as closely as possible, the stated purpose and need for the project and could be prudently implemented as a viable, reasonable alternative. As these emphases became consolidated and refined, they evolved into the four action alternative actions discussed in the Alternatives Considered section of this chapter.

In December 1991, the Interdisciplinary Team (IDT) developed criteria for deciding which timber harvest units from the 1991 multi-entry layout plan (MELP) (see Chapter 3-Timber and Vegetation) could most effectively meet the emphasis of the individual alternatives. Once the unit selection criteria were developed, the IDT began the process of assigning individual harvest units to the respective alternatives.

In February 1992, Forest Service logging systems specialists, field engineers, and Thorne Bay Ranger District presale timber personnel reviewed each proposed unit and made recommended modifications to the proposed harvest and transportation systems based upon site-specific knowledge of on-ground conditions. These changes were incorporated into the individual unit and road configurations, as well as into the assignment of units to the action alternatives. A field assessment of harvest units was initiated in fall 1991, continued during summer 1992, and is ongoing. Results of field reconnaissance will be incorporated into the Final EIS.

Items Common to All Alternatives

- Each action alternative will, as closely as possible, meet the stated purpose and need of the project, which is to make approximately 290 MMBF of timber available from the CPOW Project Area to KPC as part of the Long-Term Contract. Each alternative will comply with such Forest Service planning documents as the 1990 RPA, the Alaska Regional Guide, and the TLMP as amended, and will be consistent with the provisions of the TLMP Revision (scheduled for release in early 1993).

- All units meet visual quality objectives (VQO's) proposed for this analysis.

- All alternatives comply with Sec.301(c)(2) of the Tongass Timber Reform Act (TTRA), which states that the Forest Service shall:

  > "eliminate the practice of harvesting a disproportionate amount of old-growth timber by limiting the harvest over the rotation in volume classes 6 and 7, as defined in TLMP and supporting documents, so that the proportion of volume harvested in these classes within a contiguous management area does not exceed the proportion of volume currently represented by these classes within the management area."

  Each alternative meets this legal requirement for every management area within the CPOW Project Area (see Table 3-35 in the Timber and Vegetation section of Chapter 3).

- All alternatives comply with Sec.103(e) of TTRA which states that the Forest Service shall:

  > "...maintain a buffer zone of no less than 100 feet in width on each side of all Class I streams in the Tongass National Forest, and on those Class II streams which flow directly into Class I streams, within which commercial timber harvesting shall be prohibited...."

- Each alternative includes the standards, guidelines, and land allocations of TLMP as amended in 1986 and 1991.

- CPOW was developed in accordance with the standards and guidelines of Alternative P of the TLMP Draft Revision (1991a):

  - Preliminary analysis indicates that each individual unit proposed for harvest by any of the action alternatives meets the TLMP Draft Revision standards and guidelines for riparian management.
  - No timber will be harvested within either the 500-foot shoreline buffer or the 1,000-foot estuarine buffer.
  - Collectively all units meet the TLMP Draft Revision objectives to provide sufficient wildlife habitat to contribute to the maintanence of viable populations of wildlife species.

- Individual harvest units which were designed to be greater than 100 acres were done in compliance with current regional direction in the Alaska Regional Guide which states that:

  > "100 acres is the maximum size of created openings to be allowed for the hemlock-Sitka spruce forest type of coastal Alaska, unless excepted under specific conditions. Recognizing that harvest units must be designed to

accomplish management goals, created openings may be larger where larger units will produce a more desirable contribution of benefits."

This statement is designed to comply with legal limitations imposed on maximum size of created opening size as specified by the National Forest Management Act of 1976 (NFMA). The specific conditions listed in the Alaska Regional Guide include considerations for topography, condition of adjacent openings, effects on water quality or quantity, effects on wildlife and fish habitat, regeneration requirements, transportation, economic considerations, and harvest system requirements. Also addressed are natural and biological hazards such as windthrow, insect or disease problems, and visual absorption capacity. Any unit or combination of units more than 150 acres in size for this project require approval of the Regional Forester (see Table 3-36 in the Timber/Vegetation section of Chapter 3).

- The TLMP Draft Revision has identified portions of the Thorne River System, including Hatchery Creek, as being eligible for consideration under the Wild and Scenic Rivers Act. The river system was classified as Scenic River and was identified as a Scenic/Recreational River in Alt. P. of the TLMP Draft Revision. CPOW has deferred timber harvest on an estimated 11,276 acres within this river system.

- All timber proposed for harvest for each of the alternatives can be transported to existing log transfer facilities (LTF) at Thorne Bay, Coffman Cove, Whale Pass, Naukati, and Winter Harbor. No new LTF's are proposed for any of the alternatives.

- Ecosystem management opportunities are being developed and are incorporated into the alternatives where appropriate. Some of the activities that are responsive include:

  - snag patches
  - wildlife islands within clearcuts
  - maintenance of large, unfragmented blocks of old-growth forest
  - partial cuts for maintenance of visual quality
  - shelterwood harvest to maintain cedar component.

- No alternative proposes to harvest timber from Stevenson Island because of economic, visual, and cultural resource concerns.

- During the IDT review of the individual timber harvest units, proposed units were identified which appeared to include portions of unstable slopes where soils could be very highly susceptible to landslides. Because the suitability classification of the TLMP Draft Revision (1991a) precludes timber harvest in such areas, the CPOW project has deferred timber harvest in these identified areas (which totaled 7,741 acres), until such time as field reconnaissance can make a conclusive determination on slope stability.

- During the process of assigning units to the various alternatives, the IDT selected only those individual units or groups of units that met certain minimum feasibility standards. These feasibility standards included minimum unit size (10 acres), high probability of being harvested with the proposed logging plan, and timber economics indicator of a minimum one MMBF per mile of new road construction.

Alternatives Eliminated from Detailed Study

Alternative A

Several public comments requested the Forest Service provide a higher level of timber outputs from the CPOW Project Area during this planning period. The IDT developed an alternative which considered harvest of all units proposed in every alternative. The only additional reason for eliminating any unit under this alternative was to comply with NFMA constraints on maximum size of harvest units.

Alternative A proposed to harvest 317 individual harvest units, totaling 408 MMBF of sawlog plus utility volume from 14,331 acres, and required the construction of 156 miles of new roads. It proposed 101 MMBF scheduled for helicopter yarding.

Alternative A was dropped from consideration because it exceeded the stated purpose and need for the project by 117 MMBF (40 percent).

Alternative B

Similarly, several public comments requested the Forest Service analyze a reduced harvest within the CPOW Project Area. Because of the defined purpose and need of the project, a lower volume alternative was not considered in detail. More information on why lower volumes were not considered is included in Appendix A.

Alternatives C, D, and E

These alternatives were presented to the public in April 1992 as Alternatives 2, 3, and 4, respectively. They all proposed to harvest less than the volume required by the stated purpose and need, proposing harvest levels that were 269, 242, and 232 MMBF, respectively. They were eliminated from detailed study because they addressed issues in the same way as Alternatives 2, 3, and 4, described in detail in this EIS, which do meet the purpose and need.

Alternatives Considered for Detailed Study

Six alternatives for making timber available to KPC from the CPOW Project Area were considered in detail. For each alternative this section provides a discussion of: (1) the emphasis or intent of the alternative, (2) various resource outputs associated with implementation, (3) environmental consequences, and (4) guidelines used in selecting units and roads consistent with the emphasis. Alternatives are compared in detail later in this chapter and summarized in Table 2-1.

Alternative 1 (No Action)

Emphasis. The emphasis of this alternative is to propose no new timber harvest from the CPOW Project Area for the Long-Term Contract at this time. It does not preclude timber harvest from other areas at this time, or from the CPOW Project Area at some time in the future. It does not preclude harvest of units analyzed under previous NEPA documents but not yet felled as of the CPOW ROD. NEPA requires a "No Action" alternative be analyzed in every EIS to serve as a benchmark by which effects of the other action alternatives are to be measured. The Existing Condition map, in the separate map packet, shows the distribution of vegetation associated with no new timber harvest.

Outputs. There are no new timber harvest outputs associated with this alternative.

Consequences. There will be no new harvest within high use subsistence areas identified by the Tongass Resource Use Cooperative Survey (TRUCS) or by the 1989-94 LTS EIS. There will be no new harvest within Honker Divide, or within old-growth habitat or extended rotation areas identified by the 1989-94 LTS EIS. The habitat capability for black-tailed deer associated with this alternative is an estimated 9,409 deer. There will be 22,176 acres of old-growth forest within blocks over 1,000 acres. Changes in visual conditions will be attributable only to natural processes, and there will be no timber harvest adjacent to recreation places. There will be no new timber related employment associated with the Long-Term Contract. When harvest of units offered under the 1989-94 ROD are completed, loggers working in the Project Area would either be out of work or else displaced to other areas.

Guidelines. There were no units selected for this alternative.

Alternative 1a (No Action/No Harvest)

Emphasis. The emphasis of this alternative is to propose no timber harvest from the CPOW Project Area effective on the date of the CPOW ROD. This alternative assumes complete cessation of all timber harvest activities in the Project Area, including any areas analyzed under previous NEPA documents but not yet felled as of the date of the CPOW ROD. This affects harvest units totaling approximately 1,000 acres and 30 MMBF analyzed under the 1989-94 LTS EIS, and approximately 25 acres and 0.48 MMBF analyzed for independent timber sales. This alternative does not preclude timber harvest from other areas at this time, or from the CPOW Project Area at some time in the future. This alternative serves as a further benchmark by which to measure the effects of the other alternatives.

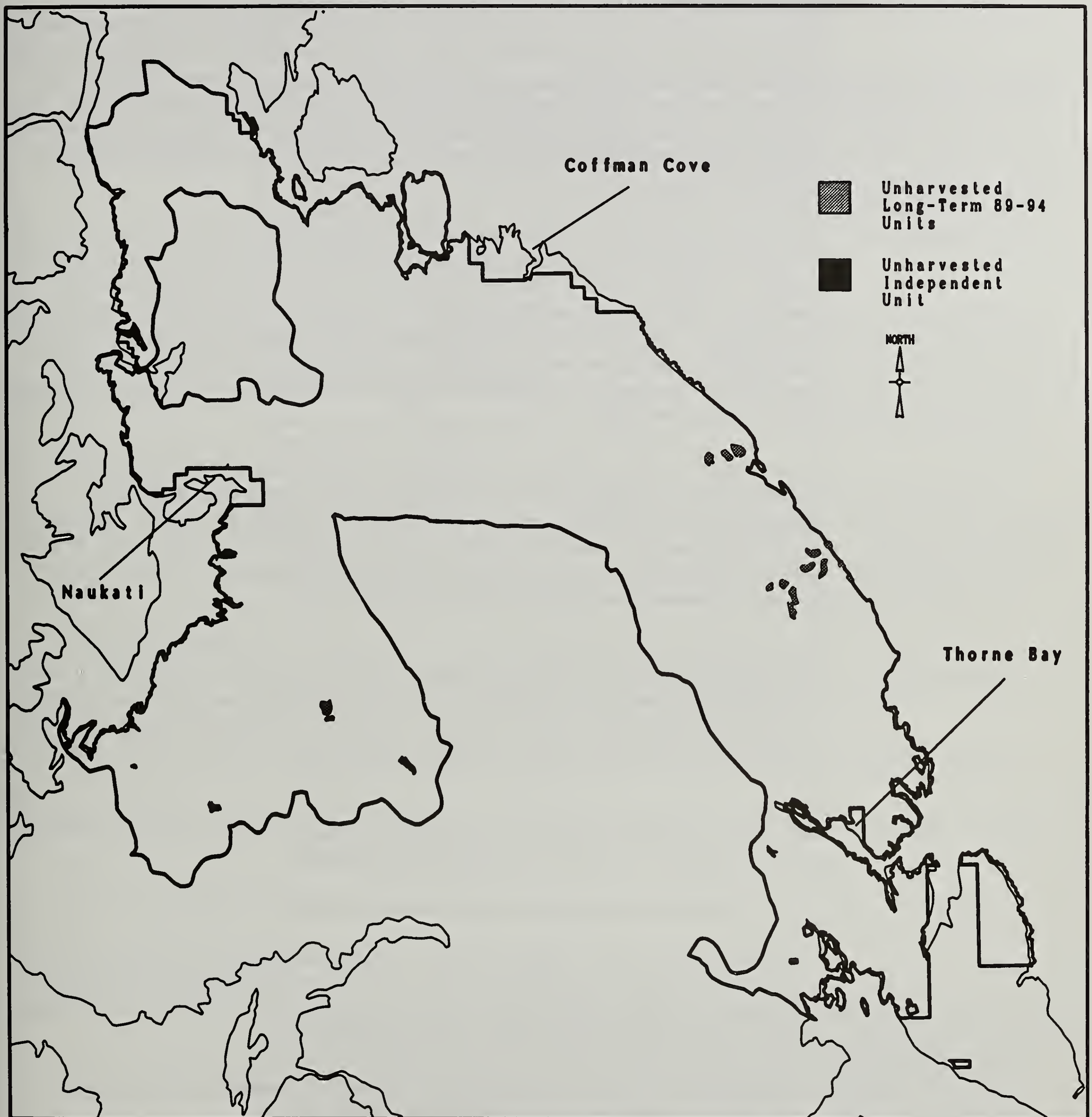
Figure 2-1 shows the location of NEPA-approved harvest units that are projected to be unharvested as of the date of the CPOW ROD and from which timber harvest operations would be cancelled.

Outputs. There are no timber harvest outputs associated with this alternative.

Consequences. There will be no harvest within high-use subsistence areas identified by the TRUCS or by the 1989-94 LTS EIS. There will be no harvest within Honker Divide, or within old-growth habitat or extended rotation areas identified by the 89-94 LTS EIS. The habitat capability for black-tailed deer associated with this alternative is an estimated 9,444 deer. There will be 22,176 acres of old-growth forest within blocks over 1,000 acres. Changes in visual conditions will be attributable only to natural processes, and there will be no timber harvest adjacent to recreation places. Starting in April 1993, there would be no timber related employment from this Project Area until a ROD from a future NEPA project authorizes additional timber harvest. Loggers working in this Project Area would either be out of work or else displaced to other areas. There would likely be substantial financial claims against the Forest Service based upon cancellation of timber harvest operations within previously offered harvest units.

Guidelines. There were no units selected for this alternative.

Figure 2-1
Long-Term Contract and Independent Units Projected to be Unharvested as of CPOW ROD Date



Alternative 2

Emphasis. The emphasis of this alternative is to meet the defined purpose and need while configuring planned harvest units throughout the Project Area to reduce harvest of high value wildlife habitat and to maintain the integrity of large, unfragmented blocks of old-growth forest within Honker Divide. This approach emphasizes a deferral of harvest within the most valuable wildlife habitats and seeks to minimize the effects of forest fragmentation. This alternative focuses on harvest of areas already roaded or close to existing roads, thereby minimizing timber entry into unroaded areas. The Alternative 2 map, in the separate map packet, shows the harvest units and associated roads proposed by this alternative in relation to physical and geographic features of the Project Area.

Outputs. Alternative 2 schedules the harvest of 226 individual harvest units, totaling 300 MMBF of sawlog plus utility volume from 10,318 acres. Of this harvest, 8 units totaling 12 MMBF and 385 acres are planned for partial cut; the remainder are planned for clearcut harvest. This alternative requires the construction of 92 miles of new specified roads plus 6 miles of temporary roads. It proposes 89 MMBF scheduled for helicopter yarding and on the remaining units achieves 2.29 MMBF per mile of specified road consruction. Preliminary analysis indicates a net mid-market stumpage value of $36.01 per MBF.

Consequences. Of the 10,318 acres proposed for timber harvest, some is planned within high use subsistence areas, as identified by the Tongass Resource Use Cooperative Survey (TRUCS) (3,252 acres) and by the 1989-94 LTS EIS (283 acres). There are 515 acres of harvest within the ridge-to-ridge definition of Honker Divide. Harvest is also planned within extended rotation (706 acres) and old-growth habitat (1,781 acres) areas identified by the 1989-94 LTS EIS.

This alternative has the habitat capability to support an estimated 9,146 deer. It maintains 13,345 acres of old-growth forest in 1,000-acre blocks. Alternative 2 results in a shift of approximately 12,000 acres from Semiprimitive Non-Motorized (SPNM) to Roaded Modified (RM), based upon the Recreation Opportunity Spectrum. This alternative will provide an annual average of 650 timber-related jobs over a four-year period.

Guidelines. Guidelines used in selecting units and roads which would be consistent with the emphasis of Alternative 2 include the following:

Defer timber harvest within all known goshawk habitat management areas.

Defer timber harvest within the large, unfragmented blocks of old-growth forest within Honker Divide and within the smaller, unfragmented block in the Staney Creek area. Much of this area is high value habitat for wildlife species thought to be associated with large blocks of old-growth forest.

Minimize forest fragmentation in other areas by concentrating timber harvest adjacent or in close proximity to existing roads.

Alternative 3

Emphasis. The emphasis of this alternative is to meet the defined purpose and need while configuring planned harvest units throughout the Project Area to reduce short-term impacts to subsistence users by deferring harvest on currently important

subsistence use areas. Most land-based subsistence use occurs adjacent to the beach, the existing road system, or existing communities; subsistence use is not prevalent in areas which remain largely unroaded, according to the TRUCS. The Alternative 3 map, in the separate map packet, shows the harvest units and associated roads proposed by this alternative in relation to physical and geographic features of the Project Area.

Outputs. Alternative 3 schedules the harvest of 233 individual harvest units, totaling 295 MMBF of sawlog plus utility volume from 10,700 acres. Of this harvest, 8 units totaling 12 MMBF and 408 acres are planned for partial cut; the remainder are planned for clearcut harvest. This alternative requires the construction of 111 miles of new specified roads plus 8 miles of temporary roads. It proposes 78 MMBF scheduled for helicopter yarding and on the remaining units achieves 1.95 MMBF per mile of specified road construction. Preliminary analysis indicates a net mid-market stumpage value of $26.77 per MBF.

Consequences. Of the 10,700 acres proposed for timber harvest, 78 acres is planned within high use subsistence areas, as identified by the 1989-94 LTS EIS. There is no harvest planned for the high use subsistence areas identified by the TRUCS. There are 1,052 acres of harvest within the ridge-to-ridge definition of Honker Divide. Harvest is also planned within extended rotation (497 acres) and old-growth habitat areas identified by the 1989-94 LTS EIS (2,260 acres).

This alternative has the habitat capability to support an estimated 9,156 deer. It maintains 11,204 acres of old-growth forest in 1,000-acre blocks. Alternative 3 results in a shift of approximately 19,000 acres from Semiprimitive Non-Motorized to Roaded Modified, based upon the Recreation Opportunity Spectrum. This alternative will provide an annual average of 640 timber-related jobs over a four-year period.

Guidelines. Guidelines used in selecting units and roads which would be consistent with the emphasis of Alternative 3 include the following:

Defer timber harvest in areas currently designated by the TRUCS as high use subsistence areas.

Minimize timber harvest in areas identified by the 1989-94 LTS EIS to be high value subsistence use areas.

Minimize timber harvest close to communities.

Alternative 4

Emphasis. The emphasis of this alternative is to meet the stated purpose and need while configuring planned harvest units throughout the Project Area with an increased focus on providing economic viability for this timber entry. This alternative does not propose any helicopter timber harvest. This approach emphasizes positive net economic return to KPC for the proposed harvest units, by seeking to minimize logging and road costs. This alternative focuses on harvest of units where the timber volume per acre is relatively high (subject to TTRA proportionality constraints) and where the harvested volume exceeds 2.0 MMBF per mile of new road construction. The Alternative 4 map, in the separate map packet, shows the harvest units and associated roads proposed by this alternative in relation to physical and geographic features of the Project Area.

Outputs. Alternative 4 schedules the harvest of 214 individual harvest units, totaling 278 MMBF of sawlog plus utility volume from 9,557 acres. All of this harvest is planned for clearcut harvest. This alternative requires the construction of 109 miles of new specified roads plus 10 miles of temporary roads. It proposes no units scheduled for helicopter yarding and achieves 2.55 MMBF per mile of specified road consruction. Preliminary analysis indicates a net mid-market stumpage value of $35.22 per MBF.

Consequences. Of the 9,557 acres proposed for timber harvest, 2,764 acres are planned within high use subsistence areas, as identified by the TRUCS (2,764 acres) and by the 1989-94 LTS EIS (391 acres). There are 1,316 acres of harvest within the ridge-to-ridge definition of Honker Divide. Harvest is also planned within extended rotation (399 acres) and old-growth habitat (2,993 acres) areas identified by the 1989-94 LTS EIS.

This alternative has the habitat capability to support an estimated 9,123 deer. It maintains 10,164 acres of old-growth forest in 1,000-acre blocks. Alternative 4 results in a shift of approximately 8,300 acres from Semiprimitive Non-Motorized to Roaded Modified, based upon the Recreation Opportunity Spectrum. This alternative will provide an annual average of 603 timber-related jobs over a four-year period.

Guidelines. Guidelines used in selecting units and roads which would be consistent with the emphasis of Alternative 4 include the following:

> Defer timber harvest in units scheduled for helicopter yarding.
>
> Confine timber harvest to units which average more than 20 MBF per acre.
>
> Select groups of harvest units which are planned to exceed 2.0 MMBF of yarded volume per mile of new road construction.

Alternative 5

Emphasis. The emphasis of this alternative is to meet the defined purpose and need by configuring planned harvest units throughout the Project Area to provide for economically viable timber harvest; to maintain the integrity of large, unfragmented blocks of old-growth forest within Honker Divide; and to protect important scenic areas. This approach emphasizes a positive net economic return for the proposed harvest units, while seeking to minimize the effects of forest fragmentation. This alternative focuses on harvest of higher volume stands, within TTRA proportionality constraints, which can provide a favorable ratio of yarded volume to mile of new road construction, while deferring harvest within the largest unroaded blocks of old-growth forest. The Alternative 5 map, in the separate map packet, shows the harvest units and associated roads proposed by this alternative in relation to physical and geographic features of the Project Area.

Outputs. Alternative 5 schedules the harvest of 216 individual harvest units, totaling 296 MMBF of sawlog plus utility volume from 10,128 acres. Of this harvest, 6 units totaling 10 MMBF from 339 acres are planned for partial cut; the remainder are planned for clearcut harvest. This alternative requires the construction of 80 miles of new specified roads plus 10 miles of temporary roads. It proposes 76 MMBF scheduled for helicopter yarding and on the remaining units achieves 2.75 MMBF per mile of specified road consruction. Preliminary analysis indicates a net mid-market stumpage value of $39.68 per MBF.

Consequences. Of the 10,128 acres proposed for timber harvest, some is planned within high use subsistence areas, as identified by the TRUCS (3,086 acres) and by the 1989-94 LTS EIS (365 acres). There are 358 acres of harvest within the ridge-to-ridge definition of Honker Divide. Harvest is also planned within extended rotation (356 acres) and old-growth habitat (1,718 acres) areas identified by the 1989-94 LTS EIS.

This alternative has the habitat capability to support an estimated 9,132 deer. It maintains 12,889 acres of old-growth forest in 1,000-acre blocks. Alternative 5 results in a shift of approximately 5,300 acres from Semiprimitive Non-Motorized to Roaded Modified, based upon the Recreation Opportunity Spectrum. This alternative will provide an annual average of 642 timber-related jobs over a four-year period.

Guidelines. Guidelines used in selecting units and roads which would be consistent with the emphasis of Alternative 5 include the following:

Defer timber harvest within the large, unfragmented blocks of old-growth forest within Honker Divide.

Defer timber harvest in the extended rotation and old-growth habitat areas identified by the 1989-94 LTS EIS which lay either within the large, unfragmented blocks of old-growth forest within Staney Creek or within the scenic viewshed (SV) LUD identified by the TLMP Draft Revision.

Defer timber harvest within the nest and post-fledging area of all known goshawk management areas.

Confine timber harvest to units which average more than 20 MBF per acre.

Select groups of harvest units which are planned to exceed 1.5 MMBF of yarded volume for every mile of new road construction.

Preferred Alternative

The USDA Forest Service has not identified a preferred alternative for the Draft EIS.

Comparison of Alternatives

The comparison of alternatives draws together the conclusions from the materials presented throughout the document and provides the results of the analysis in summary form. The following sections provide a comparison of alternatives by: (1) proposed activity, (2) significant issue, and (3) other environmental consequence.

Summary Comparison

Table 2-1 provides a summary of activities, outputs, and environmental consequences by which the alternatives may be compared.

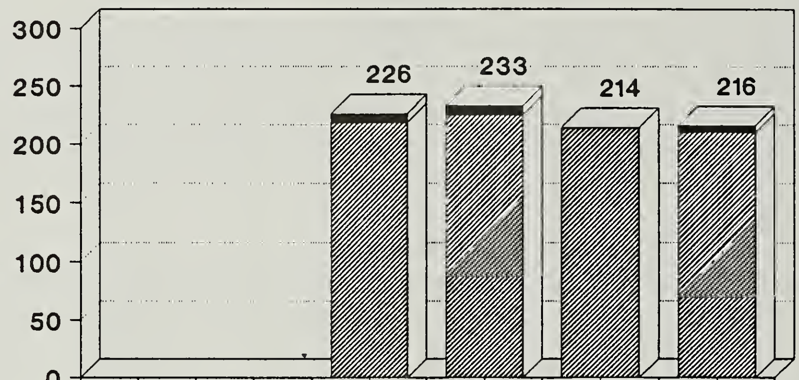
Table 2-1
Summary Comparison of Alternatives

Activity/Resource	Units	Alt.1	Alt.1a	Alt.2	Alt.3	Alt.4	Alt.5
Units	Number	0	0	226	233	214	216
Estimated volume	MMBF	0	0	300	295	278	296
Partial cut (visuals)	Acres	0	0	0	124	0	0
Shelterwood harvest	Acres	0	0	385	286	0	339
Clearcut harvest	Acres	0	0	9,933	10,290	9,557	9,789
Total harvest	Acres	0	0	10,318	10,700	9,557	10,128
Units over 100 acres	Number	0	0	27	28	21	25
Highlead harvest	MMBF	0	0	113	111	142	110
Small skyline harvest	MMBF	0	0	85	93	119	92
Slackline harvest	MMBF	0	0	13	13	17	18
Helicopter harvest	MMBF	0	0	89	78	0	76
Estimated stumpage	$ / MBF	NA	NA	$36.01	$26.77	$35.22	$39.68
Returns to state	$M	0	0	6,715	6,597	6,933	6,587
Average annual jobs over 4 years	# of jobs	0	0	650	640	603	642
Specified road constr.	Miles	0	0	92	111	109	80
Temporary road constr.	Miles	0	0	6	8	10	10
Road reconstruction	Miles	0	0	90	81	86	101
High use subsistence (TRUCS)	Acres harvested	0	0	3,252	0	2,764	3,086
High use subsistence (1989-94 LTS EIS)	Acres harvested	0	0	283	78	391	365
Old growth habitat (1989-94 LTS EIS)	Acres harvested	0	0	1,781	2,260	2,993	1,718
High vol,unfrag,old-grw.blocks >1,000 ac.	Acres	22,176	22,176	13,345	11,204	10,164	12,889
Harv.in lg.old-grw.blocks in Honk.Div.	Acres harvested	0	0	0	916	984	0
1996 MIS - deer	Habitat capability	9,409	9,444	9,146	9,156	9,123	9,132
1996 MIS - bear	Habitat capability	477	477	474	474	474	474
1996 MIS - marten	Habitat capability	469	473	449	448	448	448
1996 MIS - river otter	Habitat capability	126	126	124	125	125	125
1996 MIS - hairy woodpecker	Habitat capability	3,522	3,552	3,286	3,395	3,295	3,375
1996 MIS - brown creeper	Habitat capability	5,113	5,192	4,794	4,969	4,806	4,908
1996 MIS - Vancouver Canada goose	Habitat capability	972	975	943	941	942	943
1996 MIS - bald eagle	Habitat capability	336	336	331	333	332	331
Very high mass movement (MMI 4)	Acres harvested	0	0	0	0	0	0
High mass movement (MMI 3)	Acres harvested	0	0	3,672	4,089	3,073	3,548
Medium mass movement (MMI 2)	Acres harvested	0	0	1,895	1,670	1,922	1,899
Low mass movement (MMI 1)	Acres harvested	0	0	4,751	4,941	4,562	4,681
Wetlands harvested/roaded	Acres	0	0	3,938	5,013	4,926	3,824
Roads crossing Cl.I,II streams	Number	0	0	8	10	8	6
Change in ROS class from SPNM to RM	Acres	0	0	12,000	19,000	8,300	5,300
Roadless areas harvested	Acres harvested	0	0	3,457	5,355	2,978	3,160
Recreation places with some harvest	Number	0	0	17	13	15	18
Harvest in Honker Divide (ridge to ridge)	Acres harvested	0	0	515	1,052	1,316	358
High potential for cultural resources	Acres harvested	0	0	2,216	2,352	3,260	2,624
Potential caves	# of harvest units	0	0	28	23	34	33

Comparison of Alternatives by Proposed Activity

Each action alternative proposes harvest of over 200 individual units. Alternatives 2 and 3 propose the most units for partial cut techniques (8), while Alternative 4 proposes the fewest (0). Figure 2-2 shows the number of units proposed for harvest under each alternative, by silvicultural system.

Figure 2-2
Number of Units Proposed for Harvest, by Silvicultural System



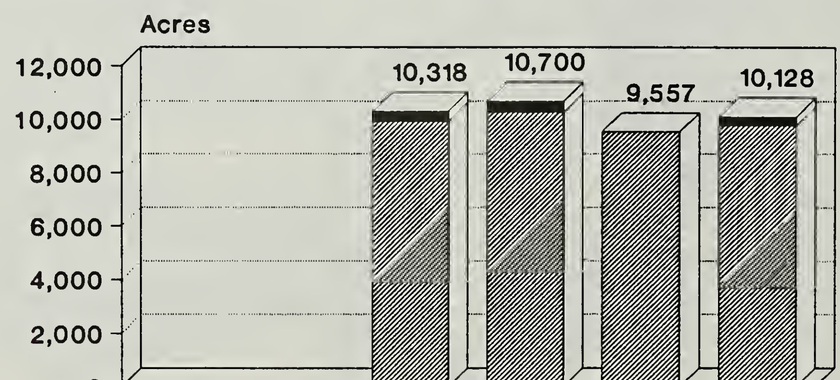
	Altn 1	Altn 1A	Altn 2	Altn 3	Altn 4	Altn 5
PC/Shelterwood	0	0	8	8	0	6
Clearcut	0	0	218	225	214	210

PC • Partial cut for visuals

Clearcut PC/Shelterwood

Each action alternative, with the exception of Alternative 4, proposes over 10,000 acres of timber harvest. Figure 2-3 shows the number of acres proposed for harvest by each alternative by silvicultural system.

Figure 2-3
Total Acres Proposed for Harvest, by Silvicultural System



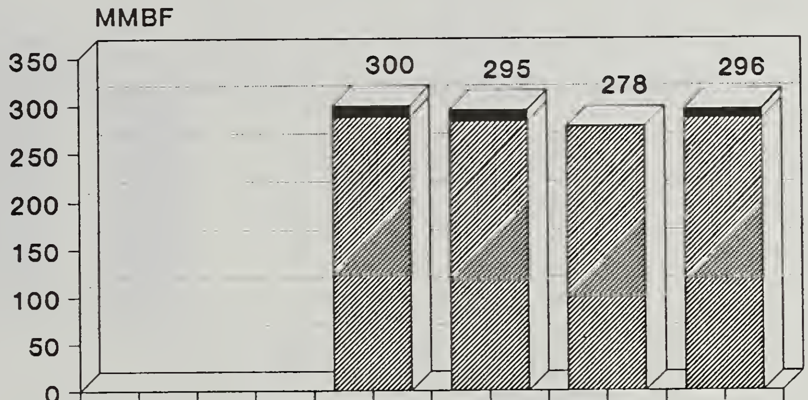
	Altn 1	Altn 1A	Altn 2	Altn 3	Altn 4	Altn 5
PC/Shelterwood	0	0	385	408	0	339
Clearcut	0	0	9,933	10,292	9,557	9,789

PC • Partial cut for visuals

Clearcut PC/Shelterwood

Each action alternative, except Alternative 4, meets the purpose and need of 290 MMBF. Alternative 4 comes within 4 percent at 278 MMBF. Figure 2-4 shows the volume of timber proposed for harvest by each alternative by silvicultural system. For the purpose of the draft analysis, the volume yield from partial cut harvests has not been reduced from that which would have been produced by clearcut harvest.

Figure 2-4
Total Volume Proposed for Harvest



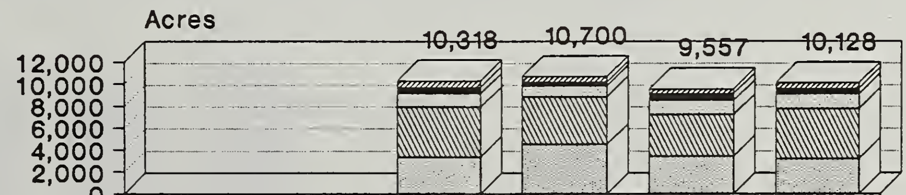
	Altn 1	Altn 1A	Altn 2	Altn 3	Altn 4	Altn 5
PC/Shelterwood	0	0	12	12	0	10
Clearcut	0	0	288	283	278	286

PC = Partial cut for visuals

Clearcut | PC/Shelterwood

Commercial forest land is divided into Volume Class Strata according to the Ketchikan Area's timber type map. Volume class information is used in numerous analysis processes, including proportionality. Figure 2-5 shows volume class breakdown for each alternative.

Figure 2-5
Proposed Harvest by Volume Class Strata

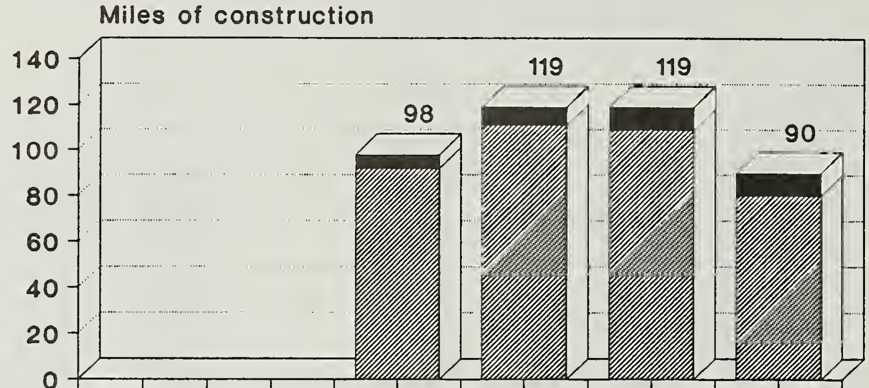


	Altn 1	Altn 1A	Altn 2	Altn 3	Altn 4	Altn 5
Unclassified	0	0	582	490	420	496
VC 7	0	0	609	360	650	518
VC 6	0	0	1,229	999	1,295	1,374
VC 5	0	0	4,521	4,341	3,747	4,526
VC 4	0	0	3,377	4,510	3,445	3,214

VC 4 | VC 5 | VC 6
VC 7 | Unclassified

Road construction is divided into two categories—specified and temporary. Figure 2-6 shows the number of miles of new road construction proposed to access the harvest units for each alternative.

Figure 2-6
Proposed New Road Construction

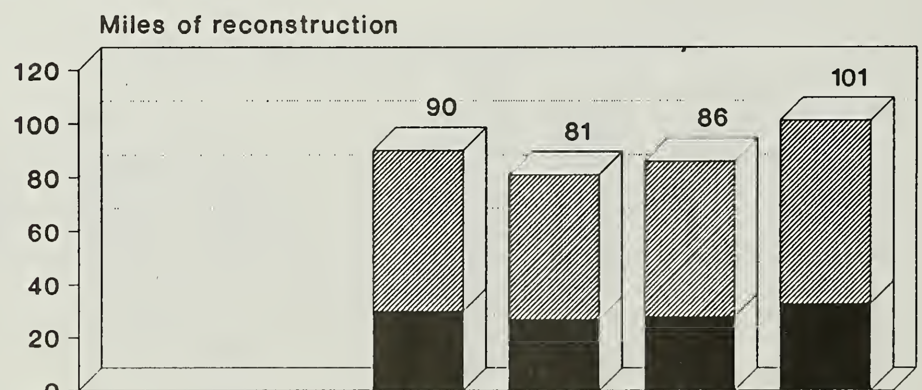


	Altn 1	Altn 1A	Altn 2	Altn 3	Altn 4	Altn 5
Temporary	0	0	6	8	10	10
Specified	0	0	92	111	109	80

Specified Temporary

Road reconstruction is divided into two categories—heavy and light, depending on the intensity of effort and materials necessary to rebuild the road to meet Forest Service standards for log haul. Figure 2-7 shows the number of miles of road reconstruction by category proposed to access the harvest units for each alternative.

Figure 2-7
Proposed Road Reconstruction



	Altn 1	Altn 1A	Altn 2	Altn 3	Altn 4	Altn 5
Light	0	0	60	54	58	68
Heavy	0	0	30	27	28	33

Heavy Light

There are three existing KPC logging camps which are expected to do the bulk of the harvest for the timber released for harvest under CPOW: Thorne Bay, Naukati, and Coffman Cove. Each of these camps has an existing LTF. In addition there are existing LTF's at Winter Harbor and Whale Pass. This analysis has roughly estimated which units or groups thereof would most economically be taken to a given LTF. Actual haul may be different. Table 2-2 shows the volume of harvest projected to be hauled to each LTF.

Table 2-2
Proposed Harvest, by Existing Log Transfer Facility, in MMBF

	Alt.1	Alt.1a	Alt.2	Alt.3	Alt.4	Alt.5
Whale Pass	0	0	12	22	23	17
Coffman Cove	0	0	61	69	64	45
Winter Harbor	0	0	4	21	9	9
Naukati	0	0	51	23	52	56
Thorne Bay	0	0	172	160	130	169

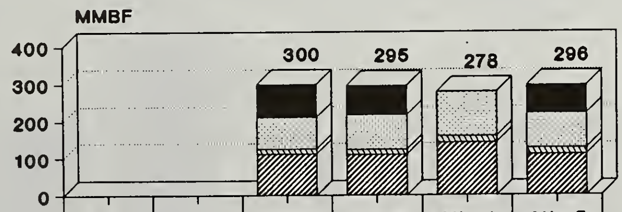
Comparison of Alternatives by Significant Issue

Chapter 1 presents in detail the significant issues that are the focus of this EIS and the key indicators for evaluating the impacts of timber harvest on each issue. This section compares the alternatives in terms of these issues. The baseline for comparing alternatives is Alternative 1, the no-action alternative.

Issue 1: Cost effectiveness of timber harvest operations

Estimated timber economics focuses on the residual value (stumpage) of the timber after all associated logging and transportation costs are subtracted. Generally speaking, the most expensive logging system is helicopter, followed by large skyline. Helicopter yarding is necessary in areas where it is impractical to build roads or where aerial logging is necessary to meet specific standards and guidelines. Alternative 2 has the most helicopter volume (89 MMBF), while Alternative 4 has none at all. Figure 2-8 compares the logging systems proposed for each alternative.

Figure 2-8
Timber Harvest by Logging System

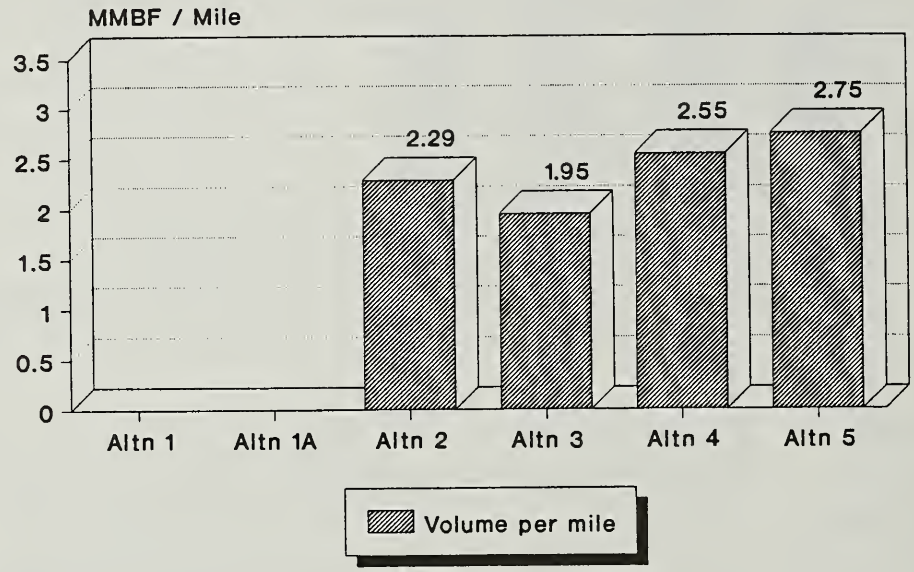


	Altn 1	Altn 1A	Altn 2	Altn 3	Altn 4	Altn 5
Helicopter	0	0	89	78	0	76
Small skyline	0	0	85	93	119	92
Slackline	0	0	13	13	17	18
Highlead	0	0	113	111	142	110

Highlead — Slackline — Small skyline — Helicopter

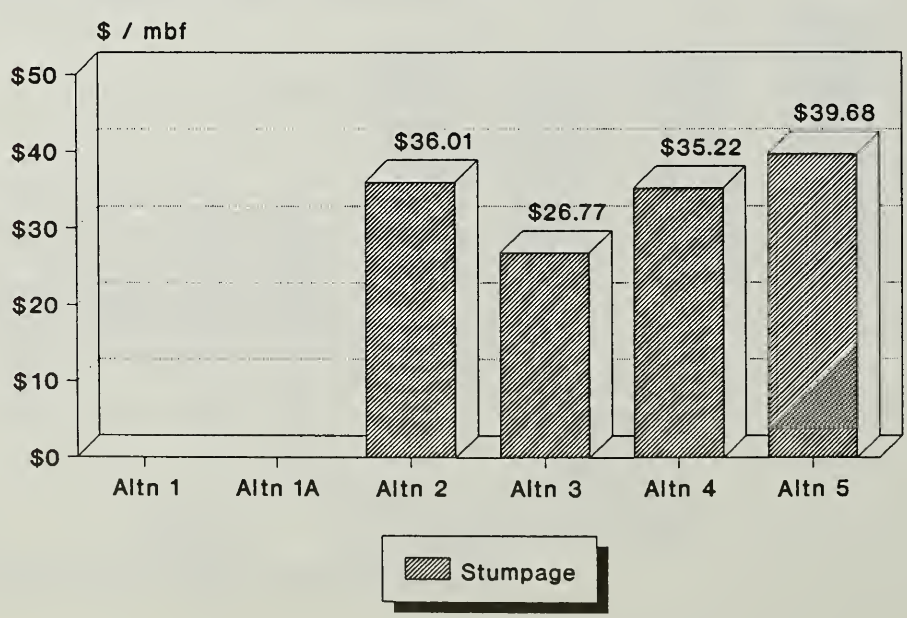
Another indicator of timber economics is the amount of non-helicopter volume which can be harvested per mile of new specified road construction (helicopter volume is excluded because it generally does not have associated new road construction). Alternative 4 (2.55 MMBF) and Alternative 5 (2.75 MMBF) have the best timber recovery in terms of MMBF per mile of new road construction, while Alternative 3 has the least (1.95 MMBF). Figure 2-9 shows timber recovery by alternative, as expressed by cable yarded volume per mile of new specified road construction.

Figure 2-9
Cable Yarded Volume Per Mile of New Road Construction



Based on the analysis of timber values in the Timber section of Chapter 3, all alternatives show a positive net stumpage, with Alternative 5 having the highest value and Alternative 3 having the lowest. Figure 2-10 shows mid-market timber stumpage by alternative.

Figure 2-10
Estimated Mid-market Stumpage Value

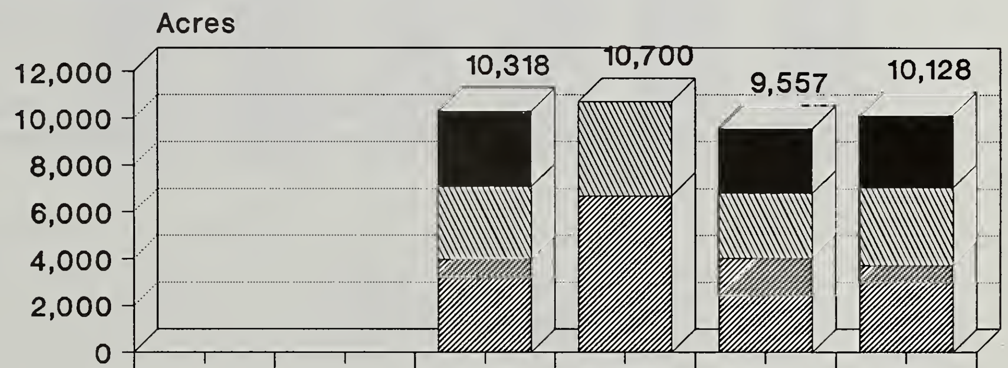


Issue 2. Impact of Timber Harvest Operations on Subsistence Use

Chapter 3 evaluates the potential site-specific effects on subsistence that could result from implementing any of the proposed timber harvest and associated road construction alternatives. Based on potential direct and cumulative effects of timber harvest, there may be a significant possibility of a significant restriction of subsistence use of deer within the Project Area under all alternatives, including the no-action alternative. The proposed alternatives do not present a similar possibility of significantly restricting other subsistence uses.

Within Chapter 2, effects on subsistence use will be measured by the acres harvested of currently highly used subsistence areas, as well as by the short- and long-term effects of timber harvest on deer populations. The TRUCS identified areas which are most heavily used by subsistence households. Based on the TRUCS, Alternative 3 harvests the fewest acres of high-use subsistence areas (0), while Alternative 2 harvests the most (3,252). Figure 2-11 compares the harvest acres for each alternative in terms of importance to current subsistence use patterns.

Figure 2-11
Subsistence Use of Harvest Units, Based on TRUCS

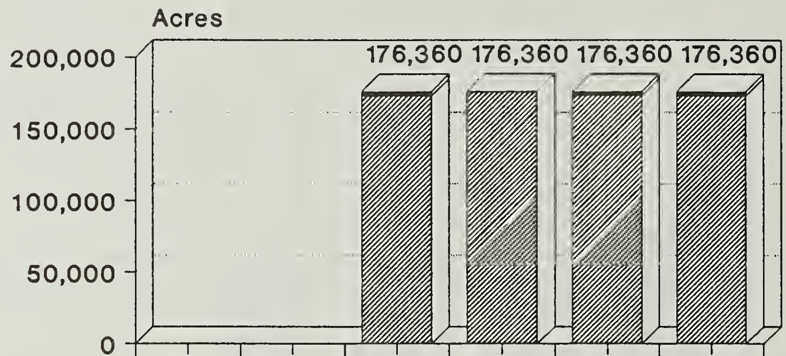


	Altn 1	Altn 1A	Altn 2	Altn 3	Altn 4	Altn 5
High use	0	0	3,252	0	2,764	3,086
Medium use	0	0	3,104	4,010	2,750	3,304
Low use	0	0	3,962	6,690	4,043	3,738

Low use Medium use High use

TRUCS identified 176,360 acres of high subsistence use areas. All the action alternatives propose harvest in less than 2 percent of these areas. Figure 2-12 shows the proportion of high use subsistence areas identified by TRUCS that is proposed for harvest by each alternative.

Figure 2-12
TRUCS High Use Subsistence Areas Harvested

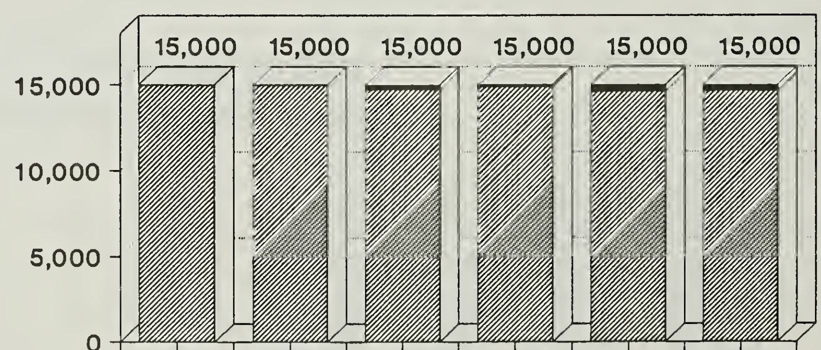


	Altn 1	Altn 1A	Altn 2	Altn 3	Altn 4	Altn 5
High use harvest	0	0	3,252	0	2,764	3,086
High use non-harvest	0	0	173,108	176,360	173,596	173,274

High use non-harvest   High use harvest

The 1989-94 LTS EIS identified approximately 15,000 acres within the CPOW Project Area that are currently heavily used by subsistence households. These areas are different from those identified by the TRUCS but are likely to have considerable overlap. Based on the 1989-94 LTS EIS, Alternative 3 proposes the least harvest in these areas (78 acres), while Alternative 4 proposes the most harvest (391 acres), as shown in Figure 2-13.

Figure 2-13
1989-94 High Use Subsistence Areas Harvested

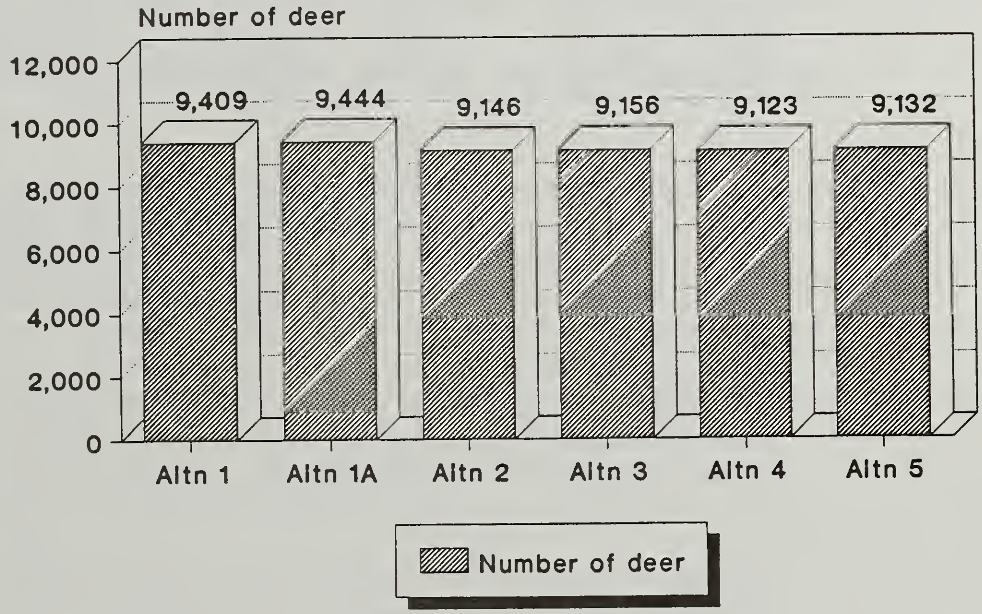


	Altn 1	Altn 1A	Altn 2	Altn 3	Altn 4	Altn 5
Proposed harvest	0	0	283	78	391	365
Not harvested	15,000	15,000	14,717	14,922	14,609	14,635

Not harvested   Proposed harvest

Deer hunting is one of the most important aspects of subsistence use, in terms of edible pounds consumed, affected by timber harvest. The Wildlife and Subsistence sections of Chapter 3 discuss the computer models used to estimate the effects of timber harvest on deer habitat capability—both long range and short range. Based on this analysis, Alternatives 1 and 1a would cause no reduction of deer habitat capabilities. Among the action alternatives, Alternative 3 would cause the least reduction to deer habitat capabilities (253), while Alternative 4 would reduce deer habitat capabilities the most severely (286). Figure 2-14 shows the estimated short-term (1996) deer habitat capability for each alternative.

Figure 2-14
Estimated 1996 Deer Habitat Capability Remaining After Timber Harvest



Issue 3. Impact of timber harvest operations on wildlife habitat

Chapter 3 contains the detailed evaluation of the potential effects of timber harvest activities on wildlife habitat and wildlife habitat capability.

The major effect on wildlife habitats in all action alternatives is the loss of old-growth forest habitat. Impacts to other habitats were greatly reduced by the interdisciplinary design of units prior to alternative formulation. All alternatives result in impacts consistent with the implementation of TLMP and the TLMP Draft Revision, Alt.P.

Table 2-3 shows the potential reduction in wildlife habitat capabilities, as estimated by habitat capability models, for the key Management Indicator Species (MIS) found in the CPOW Project Area. This table displays the 1954 long-term habitat capability and estimated short-term reduction in habitat capability after potential implementation of the alternatives.

Table 2-3
Potential Changes in Habitat Capability for MIS in 1996

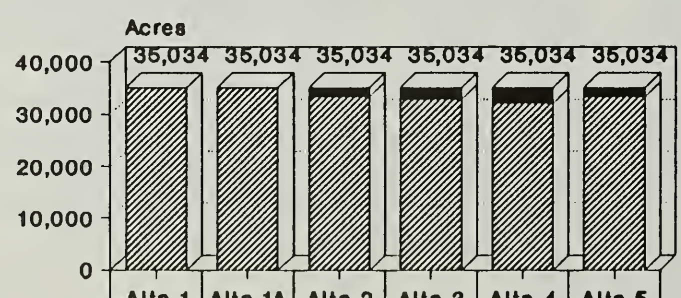
Species	Habitat Capability 1954	Habitat Capability 1993	Changes from 1993 Alt1	Alt1a	Alt2	Alt3	Alt4	Alt5
Sitka b-t deer	14,942	9,409	0	+35	-263	-253	-286	-277
Black bear	552	477	0	0	- 3	- 3	- 3	- 3
Otter	192	126	0	0	- 2	- 1	- 1	- 1
Marten	671	469	0	+ 4	- 20	- 21	- 21	- 21
Hairy woodpecker	7,725	3,522	0	+30	-236	-127	-227	-147
Brown creeper	17,725	5,113	0	+79	-319	-144	-307	-205
Van.Can.goose	1,020	972	0	+ 3	- 29	- 31	- 30	- 29
Bald eagle	518	336	0	0	- 5	- 3	- 4	- 5

The 1989-94 LTS EIS established areas that, for the duration of the project, were to be managed to provide old-growth habitat conditions. These areas were commonly termed "old-growth retention" and were in compliance with the 1986 amendment to TLMP. Within the CPOW Project Area, 1989-94 LTS EIS designated 35,034 acres to be managed to provide old-growth habitat conditions. The TLMP Draft Revision proposes areas which provide old-growth habitat (beach fringe, Primitive Recreation, and estuarine fringe), which, along with TTRA stream buffers and legislated wilderness areas, are sufficient to meet old-growth habitat requirements as identified in the existing TLMP. Consequently, the old-growth habitat areas designated by the 1989-94 LTS EIS are being reconsidered for harvest by this project.

Figure 2-15 shows the relationship of the proposed harvest of old-growth habitat to the amount established for the 1989-94 planning period. In all cases the amount of old-growth habitat proposed for harvest is less than nine percent of the total 1989-94 old-growth habitat within the Project Area.

Future planning projects will not include an analysis of 1989-94 old-growth habitat. It is being displayed by this project because of the potential for overlap of the two planning periods.

Figure 2-15
1989-94 Old-Growth Harvested Compared to Total 89-94 Old-Growth



	Altn 1	Altn 1A	Altn 2	Altn 3	Altn 4	Altn 5
OG habitat harvested	0	0	1,781	2,260	2,993	1,718
OG habitat unharvest	35,034	35,034	33,253	32,774	32,041	33,316

OG habitat unharvest OG habitat harvested

Forest fragmentation represents a change in the overall forest landscape from large, contiguous blocks of old-growth forest to smaller blocks separated by timber harvest units. Increased amounts of forest fragmentation indicate reduced habitat potential for species which are thought to be dependent on interior old-growth forest habitat. One way to analyze forest fragmentation is to measure the reduction of large, contiguous blocks of high volume old-growth forest—defined for this analysis as those over 1,000 acres in size—a result of timber harvest. The existing condition is displayed in Alternatives 1 and 1a, which show there is a total of 22,176 acres of old-growth forest habitat in blocks over 1,000 acres in size. Table 2-4 shows the remaining old-growth forest blocks greater than 1,000 acres in size after the proposed timber harvests of each alternative.

Table 2-4
Effect of Timber Harvest on Forest Fragmentation, in Acres

	Alt. 1	Alt.1a	Alt. 2	Alt. 3	Alt. 4	Alt. 5
Acres of lg., unfragmented blocks >1,000 acres remaining after harvest	22,176	22,176	13,345	11,204	10,164	12,889

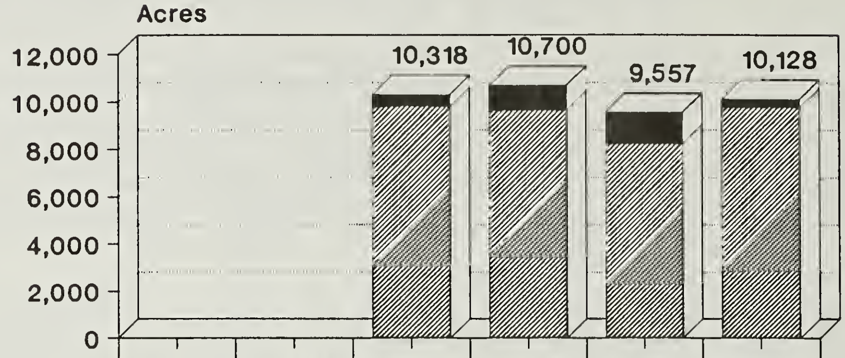
"Patch size effectiveness" is a term used in this analysis to measure the habitat capability for Sitka black-tailed deer resulting from forest fragmentation. A value of 1.0 represents old-growth forest which, due to its large size and lack of fragmentation, provides fully effective wildlife habitat. A value of 0.3 represents smaller blocks (approximately 100 acres) of second growth or low volume mature forest. Before extensive timber harvest was initiated within the Project Area (1954), the patch size effectiveness rating was approximately 0.69. A composite patch size effectiveness rating was calculated for each alternative. Alternatives 1 and 1a have an overall rating of 0.41. Alternatives 2 and 3 show an overall reduction to 0.39 and Alternatives 4 and 5 show a reduction to 0.38. For details see Chapter 3-Old Growth/Biodiversity.

Issue 4. Impact of timber harvest operations on Honker Divide

Honker Divide has several commonly accepted definitions. The most expansive definition includes all lands drained by the Thorne River and Hatchery Creek watersheds from Barnes Lake to Thorne Bay. Based on this definition, Honker Divide has approximately 86,651 acres, of which 38,350 acres are within the CPOW Project Area. Figure 2-16 shows the acres within this definition of Honker Divide that are proposed for harvest by the various alternatives. Alternative 5 proposes the least timber harvest within Honker Divide (358 acres), while Alternative 4 proposes the most harvest (1,316 acres).

Figure 2-16

Timber Harvest in Honker Divide, Using Ridge-to-Ridge Boundary, Compared to Other Areas



	Altn 1	Altn 1A	Altn 2	Altn 3	Altn 4	Altn 5
Honker Divide	0	0	515	1,052	1,316	358
Outside Honker	0	0	9,803	9,648	8,241	9,770

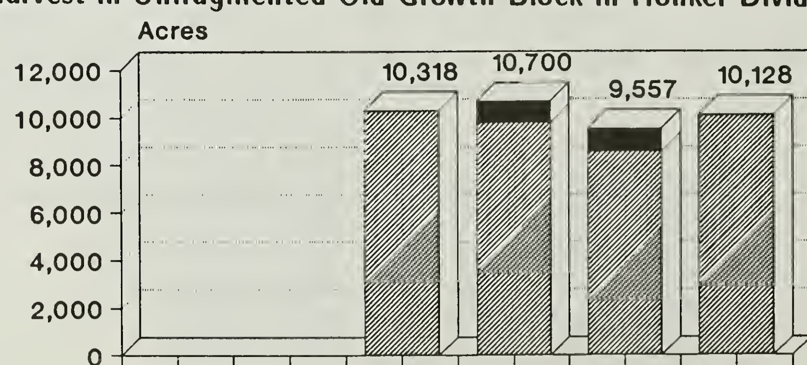
Outside Honker | Honker Divide

Another definition of the Honker Divide area is the proposed Scenic/Recreational River corridor in the Thorne/Hatchery system that is currently under consideration by the TLMP Draft Revision. There are approximately 24,357 acres within the proposed corridor, of which 11,276 acres are within the CPOW Project Area. The CPOW project has deferred harvest within this area.

A third definition of Honker Divide focuses on large, unfragmented blocks of old-growth forest within the lands drained by the Hatchery Creek and Thorne River watersheds. Chapter 1 includes a map of this area (Figure 1-7). This large, unfragmented block of old-growth forest totals 58,240 acres, of which 21,569 acres lie within the CPOW Project Area. Figure 2-17 shows the acres of harvest within this old-growth block proposed by each of the alternatives. Alternatives 2 and 5 propose the least amount of harvest (0 acres), while Alternative 4 proposes the most harvest (984 acres).

Figure 2-17

Timber Harvest in Unfragmented Old-Growth Block in Honker Divide



	Altn 1	Altn 1A	Altn 2	Altn 3	Altn 4	Altn 5
Honker Divide OG	0	0	0	916	984	0
Other harvest	0	0	10,318	9,784	8,573	10,128

Other harvest | Honker Divide OG

Issue 5. Impact of Timber Harvest Operations on Fish Habitat and Water Quality

Fish habitat capability models are used to estimate the effects of timber harvest on the capability of streams to provide habitat for selected species of salmon and trout. Because there are many factors which influence fish populations—including commercial/sport harvest, oceanic conditions, and predation—these computer models provide only relative measures of habitat capability. These models indicate that there is no change in habitat capabilities for coho and pink salmon, or for Dolly Varden char, among the alternatives, including the no-action alternatives.

There is no measurable effect on water quality or fisheries production by any of the timber harvest or associated activities proposed by any of the action alternatives. All alternatives equally apply Best Management Practices (BMP) and TTRA requirements for protection of stream courses and adjacent Aquatic Habitat Management Unit (AMHU) prescription areas.

Every watershed within the Project Area has experienced prior roading and road construction. Re-entering these drainages may generate a greater potential for impacts on water quality, with the adverse effects expected to be greater in those watersheds with the higher cumulative percents of harvest. The standards and guidelines associated with Alternative P of the TLMP Draft Revision (1991a) limit the amount of timber harvest within a given watershed to 35 percent of the total land base within a 15-year period. Table 2-5 shows past, proposed, future, and cumulative timber harvest by watershed (VCU).

Abundant aquatic resources provide numerous habitats for fishes in the Project Area.

Table 2-5
Cumulative Watershed Effects, Percentage of Watershed Disturbed

VCU	Watershed Disturbed Before 1980	Allowable Watershed Disturbance by 1996*	Watershed Disturbed by 1996					
			Alt.1	Alt.1a	Alt.2	Alt.3	Alt.4	Alt.5
549	13	48	19	19	19	20	20	21
550	29	64	38	38	42	44	44	43
551	3	38	3	3	4	5	6	4
552	19	54	26	26	26	46	40	26
553	1	36	1	1	6	14	5	1
554	10	45	30	30	32	31	32	33
557	45	80	72	72	77	74	77	77
571	12	47	29	29	34	31	34	34
572	5	40	22	22	24	22	23	24
573	5	40	17	17	19	19	21	19
574	16	51	29	29	30	31	30	30
577	19	54	38	38	40	42	42	41
579	28	63	35	35	40	41	40	41
580	14	49	16	16	20	20	18	20
581	25	60	33	33	35	34	34	34
582	2	37	2	2	7	7	6	2
583	22	57	31	30	35	35	33	35
584	23	58	32	31	38	37	34	36
585	37	72	41	41	45	45	45	45
586	15	50	22	22	23	22	23	23
587	22	57	26	26	29	27	28	31
588	32	67	41	41	48	44	46	48
589	6	41	18	18	19	22	22	20
590	21	56	26	25	31	30	27	31
598	14	49	21	21	25	25	22	28
599	0	35	2	2	8	8	9	9
600	0	35	0	0	0	0	0	0
601	0	35	1	1	1	1	1	0

* Allowable disturbance = 35% of land base within a 15-year period.

One measure of potential risk to fish habitat from timber harvest is the associated new road construction and road reconstruction which crosses streamcourses (see Chapter 3-Fisheries). During placement of culverts or bridges, sediment may be introduced into the streams which may have short- or long-term effects on water quality. Alternative 3 proposes the fewest stream crossings, while Alternative 5 proposes the most. This is shown in Tables 2-6 and 2-7.

Table 2-6
Stream Crossings to be Constructed

	Alt. 1	Alt.1a	Alt. 2	Alt. 3	Alt. 4	Alt. 5
AHMU Class I	0	0	5	4	5	4
AHMU Class II	0	0	3	6	3	2
AHMU Class III	0	0	11	10	19	17
Unclassified	0	0	70	77	68	73

Table 2-7
Bridges and Culverts to be Replaced

	Alt. 1	Alt.1a	Alt. 2	Alt. 3	Alt. 4	Alt. 5
AHMU Class I	0	0	7	7	4	8
AHMU Class II	0	0	2	1	3	2
AHMU Class III	0	0	11	8	6	9
Total crossings	0	0	109	103	108	115

Following timber harvest, there is an increased risk of landslides until second growth and the brush layer become firmly established. One way of analyzing this risk is to determine the amount of timber harvest on slopes which have high mass movement index (MMI) soils. Harvest of these slopes has a relatively small influence on introduction of sedimentation into fish-bearing streams, but does provide a measure of comparison among the alternatives. Table 2-8 shows the proposed harvest on high MMI soils by alternative. See Figure 2-21 later in this chapter for acres of combined harvest and road construction on MMI soils.

Table 2-8
Acres of High MMI Soils Harvested, by Alternative

	Alt. 1	Alt.1a	Alt. 2	Alt. 3	Alt. 4	Alt. 5
High MMI soils harvested*	0	0	3,672	4,089	3,073	3,584

* See Chapter 3-Soils for details of MMI classifications.

The TTRA prohibits commercial timber harvest within a minimum of 100 feet along all Class I streams and those Class II streams that flow directly into Class I streams. In addition, TLMP Draft Revision (1991a) standards and guidelines prohibit harvest along certain Class II and Class III streams, as determined by channel type. Timber harvest, where permitted along these streamcourses, has the potential to cause downstream effects on water quality—including sedimentation, increased water temperature, and oxygen depletion.

AHMU buffers are prescribed to regulate timber harvest and associated road construction activities adjacent to Class I and certain Class II streams. Table 2-9 shows the acres of AHMU buffer affected by road crossings

Table 2-9
Acres of AHMU Buffers Affected by Road Crossings

	Alt. 1	Alt. 1a	Alt. 2	Alt. 3	Alt. 4	Alt. 5
AHMU Buffer Acres	0	0	3.4	4.3	3.4	2.6

Issue 6. Impact of timber harvest operations on visual quality and recreation

For the purposes of this analysis, 13 viewsheds have been identified as representing the most significant of the viewsheds within the Project Area.

Table 2-10 shows the proposed VQO's for each key viewshed, and the changes in viewshed condition by alternative.

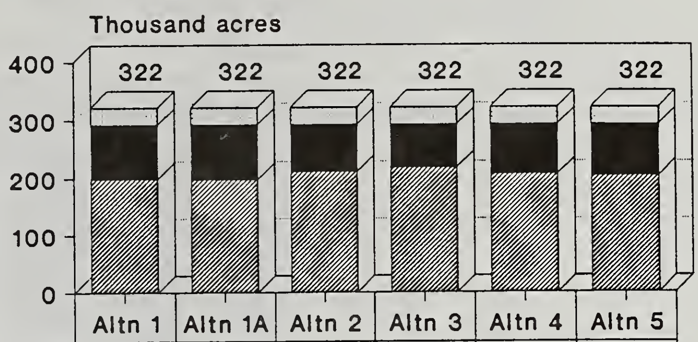
Table 2-10
Proposed CPOW VQO's and Changes in Viewshed Visual Condition

Viewshed	Proposed VQO*	Changes in Viewshed Visual Condition* Alt. 1	Alt. 1a	Alt. 2	Alt. 3	Alt. 4	Alt. 5
20 Rd-Summit	MM/MM	V	V	V	V	V	V
Staney Crk. Rd	M/MM	V	V	V	V	V	V
20 Rd-Naukati L.	MM/MM	III-IV	III-IV	IV	III-IV	IV	IV
20 Rd-Sarheen	MM/MM	II-V	II-V	III-V	III-V	III-V	III-V
20 Rd-Neck L.	MM/MM	II-V	II-V	II-V	II-V	II-V	II-V
Whale Pass	PR/M	III	III	III	IV	IV	IV
Sweetwater L.	R/PR/M	II-III	II-III	II-III	II-IV	II-IV	II-III
Hatchery L.	R/PR	IV	IV	IV	V	IV	IV
Baird Peak	M	I-III	I-III	IV	IV	IV	IV
Ratz Harbors	M/M	IV-V	IV-V	IV-V	IV-V	IV-V	IV-V
Thorne Bay	MM/MM	III-IV	III-IV	III-IV	III-IV	III-IV	III-IV
Lake Ellen Rd	MM/MM	V	V	V	V	V	V
Sal Creek	M/M	IV	IV	V	V	V	V

* I, II = R = Retention; III = PR = Partial Retention; IV = M = Modification; V = MM = Maximum Modification; VI = Beyond Maximum Modification

Implementing any of the action alternatives will change the existing Recreation Opportunity Spectrum (ROS) class from semi-primitive nonmotorized to roaded modified. Figure 2-18 shows the change in ROS class by alternative.

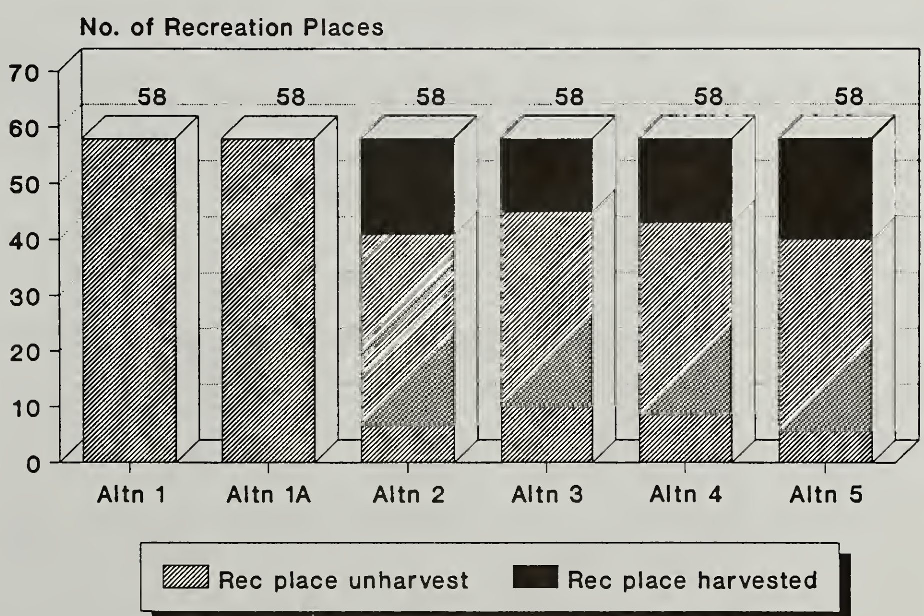
Figure 2-18
Changes in ROS Class, by Alternative



	Altn 1	Altn 1A	Altn 2	Altn 3	Altn 4	Altn 5
Other	30	30	30	30	30	30
Semi-prim. non-motor	93	94	81	74	85	88
Roaded modified	199	198	211	218	207	204

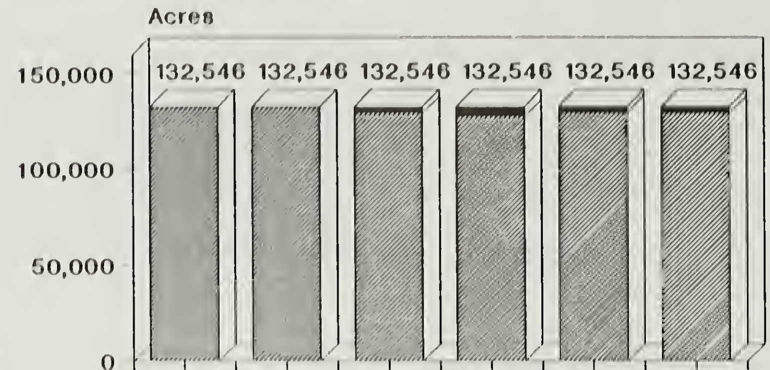
There are 58 inventoried recreation places within the Project Area. Of these, 13–18 will be affected by harvest activities proposed by any of the action alternatives. Figure 2-19 shows the number of recreation places that will be affected by proposed harvest by alternative.

Figure 2-19
Harvest within Recreation Places



The TLMP Draft Revision (1991a) identified several roadless areas which lie within or partially within the Project Area. Of these, 5 have some timber entry proposed by the alternatives. Figure 2-20 shows the number of roadless area acres proposed for harvest by alternative.

Figure 2-20
Timber Harvest within Roadless Areas



	Altn 1	Altn 1A	Altn 2	Altn 3	Altn 4	Altn 5
Roadless harvest	0	0	3,457	5,355	2,978	3,160
Roadless unharvest	132,546	132,546	129,089	127,191	129,568	129,386

Roadless unharvest   Roadless harvest

Comparison of Alternatives by Environmental Consequences

Environmental consequences for subsistence, timber, wildlife, fisheries, watersheds, recreation, and visuals have already been summarized in the preceding section. Disclosure of environmental consequences of other resources is detailed in Chapter 3 and summarized below by resource.

Threatened, Endangered, and Sensitive Species

There are no known threatened or endangered species within the CPOW Project Area. Consequently, none of the alternatives will have any effect on such species. The northern goshawk is listed as a category 2 candidate species. Three goshawk habitat management areas have been located within the Project Area: Sarheen, Hatchery, and Sarkar (near Salt Water Lagoon). The action alternatives propose harvest within two of these areas, as shown in Table 2-11.

Table 2-11
Harvest within Goshawk Habitat Management Areas, in Acres

Management Area	Alt.1	Alt.1a	Alt.2	Alt.3	Alt.4	Alt.5
Sarkar	0	0	0	0	0	0
Sarheen	0	0	0	336	335	331
Hatchery Lake	0	0	102 *	321	386	206

* One of the development criteria for Alternative 2 was to defer harvest within known goshawk habitat management areas. No active nest tree has been found within the previously occupied Hatchery Lake goshawk area. The units proposed for Alt.2 (574-210 and 574-224) are adjacent to existing clearcuts and are not expected to degrade the goshawk habitat.

Alternatives 1, 1a, and 2 will not have any impact on the productivity of the goshawk management area near Sarheen. Alternatives 3, 4, and 5 will harvest approximately 10 percent of the remaining high-volume old-growth habitat (Table 3-5 in Chapter 3-Threatened and Endangered Species). This harvest when combined with the amount of harvest that has already occurred (1,353 acres), could adversely affect the productivity of this territory.

Alternatives 1 and 1a will not have any impact on the productivity of the Hatchery Lake goshawk management area. The impact that the other alternatives will have is hard to predict since the current nests have not been located (this territory wasn't verified until after the nest tree was cut in 1991). That is the reason the suspected area is so much larger than the Sarheen territory. One way to predict an effect on goshawk productivity for the Hatchery Lake area would be based on acres harvested (assuming the territory is still active). Based on the amount of harvest within the suspected area, Alternatives 3 and 4 would be most likely to affect productivity, and Alternative 2 would have the least impact of the action alternatives. Alternative 5 would have impacts somewhat less than 3 and 4, but more than Alternative 2.

There is a haulout (resting area) for Stellar's sea lions on the south tip of Grindall Island. No developments are planned within 15 miles of this site.

Socio-Economics

The State of Alaska receives 25 percent of the sum of all net receipts from timber sold on National Forest land plus any purchaser road credits. This money is earmarked for public school and road maintenance funding. Table 2-12 shows the estimated returns to the State of Alaska from sale of timber from the CPOW Project Area, as proposed by the alternatives. Actual returns will be based upon scaled volumes and appraised rates and may be significantly different from this estimate, which is based on estimated mid-market rates.

Table 2-12
Estimated Returns to State of Alaska from Sale of CPOW Timber*

Alternative	Estimated volume (MMBF)	Estimated stumpage ($/MMBF)	Total receipts (M$)	State of Alaska returns (M$)
1	0	0	0	0
1a	0	0	0	0
2	300	36.01	10,803	6,715
3	295	26.77	7,897	6,597
4	278	35.22	9,791	6,933
5	296	39.68	11,745	6,587

* Based on mid-market rates.

By the year 1993, approximately 81,709 acres of timber will have been harvested from the CPOW Project Area. Assuming this harvest started with the beginning of the KPC contract in 1954, this averages to 2,095 acres harvested annually, which

equates to approximately 63 MMBF annually. Appendix A shows future timber entry of approximately 270 MMBF to occur within the CPOW Project Area by the termination date of the Long-Term Contract in 2004. If the CPOW proposed action is implemented, there will be a total of 560 MMBF harvested between 1993 and 2004. This is an average annual harvest of 51 MMBF. The Timber section of Chapter 3 shows annual harvest from the Project Area will be in the 10-16 MMBF range for the next 50 years following the termination of the Long-Term Contract.

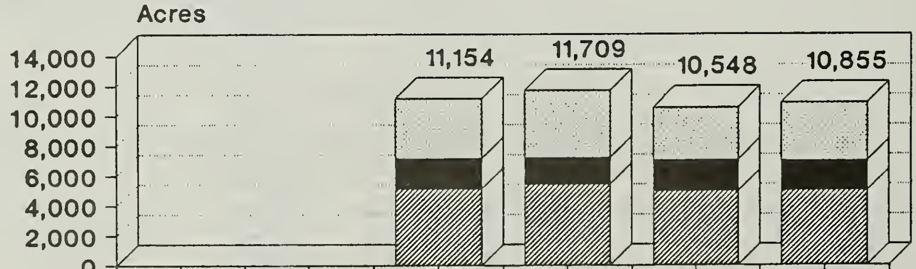
Based on this level of harvest and an estimate of 8.67 jobs generated per MMBF harvested, the level of timber-related employment from the Project Area was an average of approximately 546 annual jobs for the period 1954-1993. This level of employment is expected to fall to an annual average of 442 jobs for 1993-2004 (remaining period for the Long-Term Contract). Following completion of the Long-term Contract in 2004, there will not be sufficient volume remaining in the Project Area to sustain employment at current or historic levels. The result may be a significant disruption in local communities and logging camps within the Project Area which depend on timber employment, as timber harvesting shifts to other locations on the Forest. These workers will either be out of work or commute to other areas.

Soils

The following is a risk assessment of landslide potential as a result of timber harvest and associated road construction. Complying with TLMP Draft Revison standards and guidelines will reduce much of the landslide potential.

Landslides are most likely to occur as a result of timber harvest and associated road construction on landscapes with very high mass movement indices (MMI). There is no proposed CPOW harvest from any areas known to contain very high MMI soils. Landslides typically occur less frequently when these activites occur on areas with high mass movement indices, and, in most cases, are not common on areas with medium or low MMI class. Figure 2-21 shows the number of acres disturbed by timber harvest and road construction by mass movement index. See Chapter 3-Soils for details of MMI categories. See Table 2-8 earlier in this chapter for acres of High MMI soils harvested.

Figure 2-21
Acres of Timber Harvest and Road Construction by Mass Movement Index



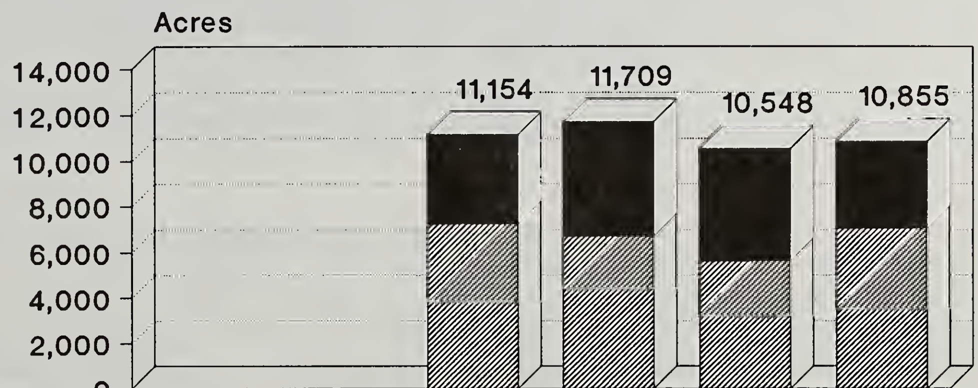
	Altn 1	Altn 1A	Altn 2	Altn 3	Altn 4	Altn 5
Very high	0	0	0	0	0	0
High	0	0	4,000	4,498	3,497	3,852
Medium	0	0	2,039	1,803	2,110	2,031
Low	0	0	5,115	5,408	4,941	4,972

Low | Medium | High | Very high

Wetlands

Approximately 50 percent (169,962 acres) of the Project Area is classified as wetlands. Executive Order 11990 requires the Forest Service to minimize the long- and short-term adverse effects associated with the destruction or modification of wetlands. Best Management Practices dictate that road construction in wetlands should be avoided where practicable, and that timber harvest within wetlands must be limited to low impact yarding systems. Figure 2-22 shows the number of acres of wetlands with timber harvest and road construction activities.

Figure 2-22
Wetlands With Timber Harvest and Road Construction Activities



	Altn 1	Altn 1A	Altn 2	Altn 3	Altn 4	Altn 5
Wetlands	0	0	3,938	5,013	4,926	3,824
Non wetlands	0	0	7,216	6,696	5,622	7,031

Non wetlands   Wetlands

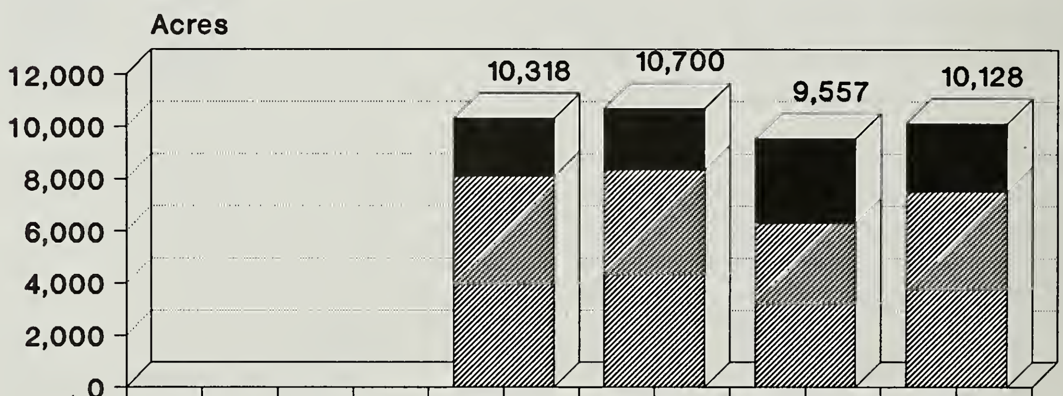
Wetlands ▪ forested, non-forested, open

Cultural Resources

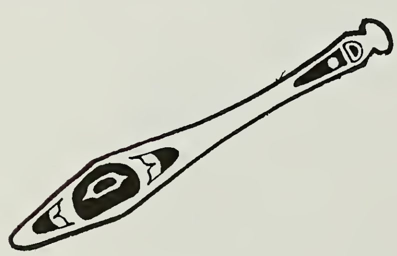
Cultural Resource Guidelines define high, medium, and low "sensitivity zones," which are based upon the probability that they may contain significant cultural resources. The Cultural Resources section of Chapter 3 specifies the factors which are used to assign a given area to a particular sensitivity zone. Based upon previous cultural resource surveys, the average site density for the Project Area is approximately one site per 133 acres in the High category, one site per 8,814 acres in the Medium category, and zero sites in the Low category.

Cultural resources within high sensitivity zones are currently being surveyed. When sites are located, protection may be afforded through avoidance, protective enclosures, systematic monitoring, mandatory restrictions on project design, or recovery and documentation of the information. The type of protection required is based upon the significance of the information discovered. See Mitigation Measures, later in this chapter, for detailed mitigation measures for cultural resources. Figure 2-23 shows the extent of areas with high potential to contain significant cultural resources.

Figure 2-23
Acres of Areas with High Potential to Contain Significant Cultural Resources



	Altn 1	Altn 1A	Altn 2	Altn 3	Altn 4	Altn 5
High	0	0	2,216	2,352	3,260	2,624
Other	0	0	8,102	8,348	6,297	7,504



Mitigation Measures

Mitigation measures are site-specific management activites to reduce the adverse impacts of timber harvest and associated activities. The Tongass National Forest uses unit cards to display appropriate mitigation measures which will be applied on a site-specific basis, as determined by reconnaissance, Forest Plan standards and guidelines, Best Management Practices ("BMP's), and other laws and regulations. Unit cards have been developed for each harvest unit and associated road proposed by the various alternatives and appear in Appendix D (Vol. II of this EIS).

Information from the unit cards is summarized here and is categorized by resource.

RECREATION

1. After harvest is complete, close new road construction into units 553-221 and 553-222 to reduce motorized vehicular access to adjacent Sarkar Lakes Management Area. This road closure will protect the integrity of the primitive recreation experience. This closure will be fairly successful in reducing car and truck access, but less effective for other types of vehicles.

2. After harvest is complete, close new roads constructed into units 598-203, 598-205, 598-206, 598-207, and 598-249, in the Paul Young Creek area. This closure will inhibit access to the Karta Wilderness Area and remain in effect until the Wilderness Implementation Schedule (WIS) is completed for that area. It should prove a fairly successful measure for cars and trucks, but be less effective for other vehicles.

3. There are 11 units adjacent to the Sarkar Lakes Management Area. A boundary establishment needs to be completed prior to layout. These units and the alternatives under which they are considered are:

Unit	Alternative
553-213	3
553-214	3
553-215	3
553-215	3
553-222	2 3
554.2-214	3 5
571-209	5
571-210	5
571-213	2 3 4
571-214	2 4 5
571-252	2 3 4 5

4. Recreation staff will assist in the design and location of roads within recreation places.

VISUALS

1. In order to meet the visual quality objectives proposed by this project, the following units are prescribed for partial cut harvest:

Unit	Alternative
574-228	3
574-239	3

2. There are two units (551-254 and 582-215) which will require boundary configuration modifications to meet the VQO's proposed by this project.

FISH, WATER QUALITY, AND SOILS

Best Management Practices. Best Management Practices ("BMP's) are methods, measures or practices to prevent or reduce water pollution. Their use is required by the TTRA and the Clean Water Act. They include structural and nonstructural controls, operation and maintenance procedures, and scheduling and distribution of activities. Usually, "BMP's are applied as a combination of practices, rather than a single practice.

An example of an "BMP is: Practice 14.6- Timing Restrictions for Construction Activities. Section 4 states "Instream construction activities and the use of equipment within Class I streams will be restricted to the periods when eggs or aelvin are not in the gravels as established in the fish timing window."

Appendix C of the Proposed Revised Forest Plan (USDA Forest Service 1991a) includes a listing of recommended Best Management Practices as identified in the Soil and Water Conservation Handbook (FSH 2509.22).

The effectiveness of "BMP's is primarily determined by the degree to which instream water quality meets state water quality standards. Although numerical standards are included in the Alaska state water quality regulations, measurements are difficult to routinely apply to the regulation of nonpoint sediment sources on road construction and timber sale sites. The Environmental Protection Agency has determined that the reasonable implementation, application, and monitoring of "BMP's achieves compliance with the intent of the Clean Water Act. Water quality studies conducted in Southeast Alaska indicate that except for short-term localized deviations from numerical standards, "BMP's are effective in maintaining sediment concentrations within state standards (Paustian 1987).

1. Design stream crossings to provide fish passage for anadromous and resident fish. This applies to proposed new road construction or major road reconstruction crossing Class I and II streams. (See Appendix D, Unit Cards.)

2. Time road construction activities within all Class I and some Class II streamcourses to protect spawning adult fish and their eggs and fry from disturbance. This means instream road construction activities must be conducted during time periods that would not cause reductions in egg or fry survival or disturb spawning adults. Generally road construction activities adjacent to streams will be restricted to the time period May 15 to August 15.

3. Where possible split yard on all identified streamcourses to maintain streambank stability and prevent stream sedimentation. Recon information has identified areas

where it may not be possible to split yard on all identified streamcourses. In these instances, it will be necessary to provide full log suspension over these streams. These units include:

Units	Alternative			
549.2-230			4	
551-250			4	
553-200		3		
553-228	2			
553-235	2	3		
571-235	2	3	4	5
571-267	2		4	5
571-268	2		4	5
583-233	2	3		5
588-257	2		4	5

4. Reduce the potential for landslides by providing for full bench road construction and end haul of waste in areas with very high potential for mass movement, as well as in other areas as determined by geotechnical engineers.

5. Another means of reducing the landslide potential is to maintain partial log suspension on all slopes with high mass movement potential. Ground disturbance should not exceed 10 percent. This should be closely monitored on units planned for highlead logging and 75 percent or more of the area classified as high mass movement index (MMI) soils.

Unit	Alternative			
550-206			4	5
577-204			4	5
577-280	2	3	4	5
577-281	2	3	4	5
577-286	2	3	4	5
579-205		3		
583-229	2	3	4	5
586-201	2		4	5
588-215B			4	
588-312	2		4	5
589-230		3		
589-231		3	4	5
589-263		3	4	
589-275		3	4	
589-203				5

6. For National Forest-permitted LTF's, the grade of the working surface shall be constructed to back drain water away from the working face toward filter strips or collection/settling basins. Clean up of bark and debris will occur on a frequent basis.

WILDLIFE AND THREATENED & ENDANGERED SPECIES

1. To provide microdiversity within harvested areas, leave windfirm, no-cut timber islands within proposed harvest units greater than 100 acres in size. These islands will vary in size from 1 to 5 acres, with the goal being to have 1 acre of no-cut, windfirm island per 20 acres harvested. The location of these islands will be determined during layout or sale administration, and will be designed in such a fashion as to not impose undue safety hazards on logging contractors. These "leave islands" are planned for the following units:

Units	Acres	Alternative
550-214 550-239	115	2,3,4
550-230	104	3,4,5
551-249 551-250	110	4
552-201 552-202	115	3,4
552-203 552-204 552-206 552-215	120	3
552-212 552-219	148	3
552-258 552-259 573-270	125	3
571-227	123	2
571-226 571-227	174	4
571-267 571-268	110	2, 4,5
573-203 573-274 573-275	127	4
573-314	110	4
574-247 574-248	122	2, 5
579-208 579-209	133	2,3,4,5
579-215 579-216 579-219	115	4,5
580-212 580-213	149	2,3, 5
580-218 580-219	108	2,3, 5
580-221 580-239	114	2,3, 5
580-227 580-227B	119	3,4
582-214 582-215	107	2,3,4
583-215 583-216	142	2,3, 5
583-242 583-243	129	2,3
584-220 584-220B 584-263	106	2,3,4
584-250 584-251	119	2,3,4,5
584-272	140	2,3
585-201 585-202 585-203	104	2,3, 5
585-201 585-202 585-203 585-204	139	4
586-226 586-227	139	5
586-225 586-226 586-227 586-228	303	4
586-228	103	2,3
587.1-208 588-324	159	3
588-215 588-215B 588-216	102	4
588-268 588-269	115	3
588-269 588-270	136	2, 4,5
588-277 588-278	116	2
588-278 588-279	138	5
588-300 588-302	161	5
588-301 588-302	124	2
588-310 588-312	142	2 5
588-322	139	2, 4,5
588-327	117	2,3, 5
589-203 589-204 589-205	134	3
589-232 589-233	102	3,4,5
589-257	118	2, 5
589-274 589-275	126	3,4
590-210 590-211	129	2,3, 5
590-229 590-230	112	2, 5
590-243	103	2,3, 5
598-207 598-207B	152	5
598-220	122	2,3, 5

2. Provide for habitat requirements of cavity and snag dependent Management Indicator Species (MIS) by leaving 275 snags per 100 acres averaged over each VCU. To provide for adequate distribution of snags within VCU's which have marginal numbers of snags, the following units will have small 0.1-acre (or larger) snag patches distributed throughout the unit at a rate of 0.1 acre per 10 acres of unit. The location of these snag patches will be determined during layout or sale administration, and will be designed in such a fashion as to not impose undue safety hazards on logging contractors.

   Guidelines for placement of snag patches and old-growth islands include:

   a. Areas where wildlife use is concentrated (determined during recon).
   b. Selected areas should be at least 100 feet away from unit boundary (unless the unit boundary is an existing second-growth stand; then the patch or island can be placed along the unit boundary).
   c. Patches or islands can be placed along split yard sections of harvest units, particularly split yard streams.
   d. Snag patches or old-growth islands can be incorporated into stream buffers.
   e. Snag patches or old-growth islands can be placed along boundaries of muskegs.

Units which will employ these snag recruitment techniques include:

Units	Alternative
579-212	2 3 4 5
579-213	2 3 4 5
579-214	2 3 5
579-222	2 3 4 5
579-223	4 5
598-245	2 3 4 5
583-227	2 3 5
585-215	2 3 4 5
557-201	2 3 4 5
557-202	2 3 4 5
587.1-208	2 3 5
588-327	2 3 5
550-230	3 4 5

3. Region 10 goshawk management guidelines in effect at the time of unit release will be followed. The interim guidelines issued August 18, 1992, call for no harvest within the immediate timber stand (20–30 acres) containing an identified nest tree, limited harvest (five percent per decade) within the adjacent 600 acres (post-fledging area), and mapping out approximately 6,000 acres for the foraging area.

All known goshawk nests and any new nests discovered during field recon or unit layout will be protected from timber harvest and blowdown by a minimum 660-foot buffer around the nest tree. Units affected by potential goshawk protection measures include:

Units	Alternative			
549.2-201				5
549.2-205		3		5
549.2-206		3		5
549.2-207				5
549.2-230			4	
550-206			4	5
550-208				5
550-209			4	
550-211		3	4	5
550-227		3	4	
550-228		3	4	5
550-230		3	4	5
554.2-206			4	5
574-210	2	3	4	5
574-224	2	3	4	
574-228		3		
574-238			4	
574-239		3		
577-200			4	5
577-201			4	5
577-202			4	5
577-204			4	5
577-205		3	4	
577-205B		3	4	
577-320		3	4	

4. Due to the limited information available on nesting habitat requirements of marbled murrelets, any nests located during field recon or unit layout will be assessed on a case-by-case basis.

5. To protect wildlife habitat or populations from vehicular access, the Access Management Plan, Option B of the 1989-94 LTS EIS, will be implemented. Basically, this plan calls for the closure (by gate) of all dead-end Local roads or other roads which provide access to wildlife habitat management areas (see Chapter 3-Transportation). The Final EIS may make changes to the Access Management Plan based on (1) newly identified wildlife habitat management areas, or (2) areas to which the Forest Service must maintain temporary access for silvicultural treatments.

6. Timber harvest units that are within a half mile of Barnes and Sweetwater lakes and Gold and Galligan Lagoon will have harvest and road construction activities limited to the time period when trumpeter swans are not present (normally from April 1 to October 31). This affects the following units:

Unit	Alternative
552-226	3
552-269	3
552-270	3
552-271	3
552-273	3 4
573-210	4
573-225	4
573-228	4
573-264	4
573-268	4
573-289	4

TIMBER

1. It is desirable to maintain the cedar component in stands where it naturally occurs. Because cedar tends to regenerate poorly following clearcut harvest in some stands, it is desirable to not harvest the mature cedar but to retain that vegetative structure for biodiversity and to establish cedar regeneration. Silvicultural methods such as seed tree or shelterwood are appropriate to meet specific resource objectives. Areas identified to be best suited for cedar regeneration include units within the cedar or mixed conifer plant association that are proposed for helicopter yarding and having either elevations over 1,200 feet (on north and east aspects) or over 1,500 feet (on south and west aspects). Specific units identified as meeting this criteria include:

Units	Alternative(s)
573-249	2 3 5
573-251	2 3
580-200	2
583-242	2 3 5
588-283	2 5
590-201	2 3 5
590-210	2 3 5
590-219	2 3 5

2. Based on preliminary recon there are some units which, because of their elevation, aspect, or indigenous plant association, may have problems establishing adequate natural regeneration. Supplemental hand planting will be done as necessary.

CULTURAL RESOURCES

Cultural Resource Guidelines assign high and low sensitivity levels to areas based on their probability to contain significant cultural resources. This assignment is made upon several factors including: containing an existing, known site; lying below 100 feet elevation; having potential to contain caves; and being adjacent to major salmon streams or lakes. When cultural resources are discovered in proposed harvest units, the type of mitigation will vary according to the significance of the site.

Potential effects on cultural resources can be minimized by excluding project activities from most high sensitivity areas (exceptions are LTF's, camps, a small number of units, and access roads to these facilities). Types of mitigation measures include avoidance, protective enclosures, monitoring of harvest activities, restrictions on unit

size or road location, and recovery and documentation of materials. Units which have been classified as high sensitivity will be surveyed during the 1992 field season.

Upon completion of the prescribed surveys, all sites identified within areas of proposed activity will be evaluated. In accordance with 36 CFR Part 60, the criteria for evaluation of the significance of a property for listing on the National Register of Historic Places will be applied; for those properties found eligible for the National Register, a Determination of Effect will be made as directed in 36 CFR Part 800.

Potential effects from environmental modification may require mitigation to achieve an effect that is considered to be not adverse in consultation with the State Historic Preservation Officer and the Advisory Council on Historic Preservation. These potential effects are diminished when the physical settings around significant cultural resources are maintained in a natural state.

Mitigation measures will be outlined in the Determinations of Effect where required, with avoidance being the preferred mitigation plan. Mitigation of potential effects to cultural resources other than avoidance may include protective enclosures, systematic monitoring of project activities, or mandatory restrictions on project design. When impacts cannot be avoided, systematic recovery of the information through excavation, collection of materials, and detailed documentation may be required as determined through consultation with the State Historic Preservation Officer and the Advisory Council on Historic Preservation.

Contracts may be modified by the Forest Service to protect cultural resources which may be discovered during the course of the Purchaser's operations. The KPC Long-Term Contract states that "in the event that any cultural resource is identified, both parties shall be notified immediately. The Purchaser shall protect all cultural resources against destruction, obliteration, removal, or damage during the operating period. "

The following units were designated for complete cultural resource surveys in the CPOW Project Area. The Final EIS will present results of the survey.

CPOW UNITS DESIGNATED FOR COMPLETE CULTURAL RESOURCES SURVEY

Units selected were high-probability based on the following criteria:

1. Units with 2 or more acres < 100' elevation
2. Units in karst topography areas
3. Units bordered by Class I streams
4. Units adjacent to archaeological sites or mines

Unit #	# Acres	Alternatives	Criteria
549.2-201	31	5	3
-205	29	3	2
-206	37	3	2
-207	20	5	2
-230	31	4	2
550-206	16	4,5	2
-208	20	5	2
-209	34	4	2
-211	44	3,4,5	2
-213	39	2,3,4,5	2
-214	20	2,3,4,5	2
-215	37	2,4,5	2
-218	57	2,3,5	4 (site)
-222	24	2	4 (site)
-227	71	3,4	2
-228	50	3,4,5	2
-230	105	3,4,5	2
-237	36	2,3,4	2
-238	22	2,3,4	2
-239	95	2,3,4	2
552-201	60	3,4	1
-216	36	3,4	3
-221	56	3,4	1
-223	28	3	1
-226	16	3	1
-258	19	3	1,4 (site)
-262	28	3,4	1
-269	43	3	1
-270	20	3	1
-271	30	3	1
553-209	19	3	3
-211	50	3	3
-245	39		3
554.2-200	54	2,5	2

CPOW UNITS TO SURVEY continued

Unit #	# Acres	Alternatives	Criteria
554.2-201	18	2,5	1
-206	46	4,5	1,4 (site)
-213	26	2,4	1,4 (mine)
-214	46	3,5	1
-215	27	3,4,5	2
-220	62	2,4,5	1,2,4 (site)
-225	25	2,4	1,4 (site)
557-200B	77	2,4,5	2
-202	42	2,3,4,5	2
571-214	34	2,4,5	2
-225	11	2,4,5	2
-227	122	2,4	2
-252	51	2,3,4,5	2
-253	91	2,3,4,5	2
-256	43	2,3,4,5	2
-257	66	2,4,5	2
-258	48	2,5	2
-260	61	2	2
-265	32	2,4,5	2
-266	73	3,4,5	2
-267	48	2,4,5	1,2
-268	64	2,4,5	2
-274	28	2,4,5	1,4 (site)
572-222	40	2	3
-226	30	2	3
573-210	21	4	1
-228	29	4	1,4 (site)
-264	67	4	3
-268	66	4	3
-274	63	2,4	1
-289	69	4	3
-296	73	3,4	1
-297	61	3,4	1,4 (site, mine)
-308	57	3	4 (site, mine)
-314	110	4	4 (site, mine)
577-202	21	4,5	2
-214	46	2,3,5	2
-280	18	2,3,4,5	2
-281	27	2,3,4,5	2
-284	48	2,3,4,5	2
-286	52	2,3,4,5	2

CPOW UNITS TO SURVEY continued

Unit #	# Acres	Alternatives	Criteria
579-223	41	4,5	3
580-227B	42	2,3,4,5	2
581-204B	47	2,4,5	1
583-216	83	2,3,5	3
-229	53	2,3,4,5	1
-256	38	2,3,4,5	1
-258	81	3,4,5	1
584-250	52	2,3,4,5	1,4 (site)
-251	67	2,3,4,5	3
-252	27	2,4,5	1,4 (site)
-267	29	2,3	4 (site)
587.1-212	42	3,5	1
-212B	19	5	1
-214	35	2,4,5	1
-220	42	2,4,5	1
-221	38	2,4,5	4 (site)
588-215B	32	4	1
-237	41	4	3
598-203	44	5	4 (site, mine)
-206	26	5	4 (mine)
-218	58	2,4,5	3
-235	26	2,3	4 (mine)
-245	38	2	4 (site)
-249	73	5	1

CAVES

The standards and guidelines for cave resource management proposed for the TLMP Draft Revision (1991a) have been formulated from field observations. Though the Federal Cave Resources Protection Act charges the Forest Service with protection only of significant caves, the Tongass National Forest is working to protect all significant karst resources. Until resource values are determined, the Ketchikan Area is considering all caves to be significant.

Increased emphasis has been put on identifying significant karst features and caves within the proposed timber sale units in order to mitigate the effects of surface management activities on the karst and cave resources. Upon completion of the prescribed surveys, all cave resources identified within the areas of proposed activity will be evaluated. If a cave is found to be significant, it shall be nominated for listing on the National Register of Significant Caves.

2 Alternatives

Alternative methods of timber harvest are being considered to protect these unseen features.

Specific Mitigation Efforts for Caves

Areas which are underlain with karst geology (limestone) have increased probability of containing caves. Units which have been determined to include limestone formations are listed below. Appropriate mitigation measures as discussed on the next page will be applied as necessary.

Unit	Alternative
549.2-205	3 5
549.2-206	3
549.2-207	5
549.2-230	4
550-206	4 5
550-208	5
550-209	4
550-211	3 4 5
550-213	2 3 4 5
550-214	2 3 4 5
550-215	2 4 5
550-227	3 4
550-228	3 4 5
550-230	3 4 5
550-237	2 3 4
550-238	2 3 4
550-239	2 3 4
554.2-200	2 5
554.2-215	3 4 5
554.2-220	2 4 5
557-200B	2 4 5
557-202	2 3 4 5
571-214	2 4 5
571-225	2 4 5
571-227	2 4
571-252	2 3 4 5
571-253	2 3 4 5
571-256	2 3 4 5
571-257	2 4 5
571-258	2 5
571-260	2
571-265	2 4 5
571-266	3 4 5
571-267	2 4 5
571-268	2 4 5
577-202	4 5
577-214	2 3 5
577-280	2 3 4 5
577-281	2 3 4 5
577-284	2 3 4 5
577-286	2 3 4 5
580-227	2 3 4 5

1. If a previously undiscovered site is found during the course of the project, the timber sale administrator will suspend any work that might potentially damage the cave resource. Work may resume after consultation with the local cave management specialist and appropriate line officer.

2. Surface management activities should be designed so as not to impede or divert surface and groundwater flow into a cave or significant karst feature.

3. Retention of vegetation is required in the vicinity of a cave or significant karst feature to protect the cave's microenvironment. The extent and limits of windfirm no-harvest buffers surrounding significant karst features shall be determined on a case-by-case basis. Topographic breaks and vegetation patterns should be utilized during buffer design and layout.

   In some instances, when a windfirm no-harvest buffer cannot be designed, it may be possible to leave all nonmerchantable timber and ground cover intact, removing the overstory by directionally falling trees away from the significant karst feature. There shall be no ground disturbing activities on slopes steeper than 30 degrees adjacent to cave entrances.

4. Buffers shall be maintained around all direct drainages into significant karst features. This includes dolines, cave collapse areas known to open into a cave's drainage system, and perennial, intermittent or ephemeral streams flowing into caves. The immediate area surrounding resurgence streams shall be protected to ensure stability of the cave ecosystem.

5. Where timber harvest is occurring in the vicinity of a cave, fall trees directionally away from the cave and its course. Yarding should not drag timber across and/or through significant karst features. Trees felled into or across significant karst features shall be not be removed. Any small woody debris that has found its way into significant karst features shall be hand removed within 48 hours.

6. No significant karst feature shall be used as disposal sites for slash, spoils, or other refuse.

7. Design roads and related construction to avoid altering surface drainage into significant karst features or focusing sediment from road surface and/or drainage into significant karst features. Any excavation requiring blasting in the vicinity of a cave should be carefully designed to ensure that seismic shock does not affect the fragile formations in the cave, destabilize cave passages, or alter groundwater flow into the cave.

8. Seasonal closures prohibiting construction activities in some areas may be required to ensure protection of roosting and hibernating bats, nesting birds, or seabird rookeries.

9. Because public use of caves may lead to the degradation of cave resources, protection measures may include maintaining confidentiality about specific site locations, limiting public access as required, and monitoring.

Monitoring

Monitoring is designed to determine if the resource management objectives of the CPOW Final EIS have been met. The results will be used to verify implementation and effectiveness of selected mitigation and protection measures in a timely manner. Three types of monitoring were recognized in the development of this monitoring plan and are described below.

Implementation Monitoring

Implementation monitoring assesses whether the project was implemented as designed and whether it complies with the Tongass Land Management Plan (TLMP). Planning for implementation monitoring began with the design of this timber sale. Specialists used on-the-ground inventories, computer inventories, and aerial photographs to prepare documents called unit cards for each harvest unit in the timber sale and the proposed road construction associated with that unit (see Appendix D). Resource specialists wrote their concerns on the cards and then described how the concerns could be addressed in the design of each unit and road segment. These documents will provide the basis for determining whether recommendations were implemented for various aspects of timber harvest.

Implementation monitoring is part of the administration of a timber sale contract. The sale administrators and road inspectors assure that the prescriptions contained on the unit and road cards are implemented.

Best Management Practices

Implementation monitoring of soil and water resources will largely consist of monitoring Best Management Practices (BMP's) and Aquatic Habitat Management Unit (AHMU) prescriptions. BMP's, as defined in the Region 10 Soil and Water Conservation Handbook (FSH 2509.22) are procedures designed to ensure protection of soil and water resources. One major objective of this strategy is to do initial implementation and effectiveness monitoring of Forest Service BMP's by December 1992. The Ketchikan Area is currently developing a BMP monitoring strategy and action plan to achieve this objective. BMP monitoring in the CPOW Project Area will follow the general guidelines outlined in this action plan. BMP's to be monitored at a specific site are determined through a review of unit/road cards, fish habitat report, and other appropriate documentation.

Preharvest Issues of Concern

Preharvest issues of concern include land-disturbing activities on high MMI soils (BMP's 13.2, 13.5, and 13.16); road and landing locations (BMP's 13.10, 14.3, 14.6 through 14.10, and others); and channel stability and streamside management, including stream temperature sensitivity (BMP's 12.6, 12.7, 13.9, and 13.16). BMP's are prescribed for most all units or road segments. Review unit and road cards for all alternatives (Appendix D) to see how BMP's are prescribed.

Timber

Timber Unit Layout

Objective: To minimize the effects of timber harvest on other natural resources.
Desired Result: Timber harvest units will meet standards and guidelines.
Measurement: Unit card will identify resource concerns, mitigation measures, and integrated direction. Sale layout employees will follow guidance on the cards. Specialists from other resources will assist in unit layout where indicated on the unit cards. At a minimum, 20 percent of the units implemented each year will be sampled for compliance with unit card design (BMP's 13.3 and 13.8).
Threshold: Sample of units should be within 10 percent of the parameters stated on the unit card.
Corrective Action: If needed, determine why unit was not laid out as designed. Document changes if they benefit the environment; change unit layout to match the design if effects are within BMP's.
Responsible Staff: Thorne Bay District Ranger.
Record of Results: "As-laid-out" unit cards.
Annual Cost: $3,000.
FTE Needs: 0.1 FTE.

Timber Unit Yarding

Objective: To ensure yarding minimizes the potential risk of soil loss on units with inclusions of high hazard soils.
Desired Result: Protect high hazard soils from erosion, especially soils within V-notches.
Measurement: Implementation of Long-Term Contract specifications for log suspension. Specialists may spot check up to 20 percent of the units with high hazard soils for compliance with BMP's (BMP's 13.2, 13.4, 13.5, 13.9, 13.12, and 13.15).
Threshold: Exposure of more than 10 percent of the affected area to bare mineral soil.
Corrective Action: Stop implementation and resolve between sale administrator, soil scientist, and timber sale operator. If not resolvable at the field level, elevate to District Ranger.
Responsible Staff: Thorne Bay Ranger District (TNB RD) sale administration employees and soil scientist in the Ketchikan Area Supervisor's Office (SO).
Record of Results: Daily diaries prepared by engineering representatives and sale administrators. Soil scientist memos documenting field verification activities.
Annual Costs: Ongoing work; no additional funding needed.
FTE Needs: Zero.

Roads

Soil and Water Protection

Objective: To ensure that roads are located to minimize impacts to soil and water.
Desired Result: Impacts to soil and water resources are minimized (BMP's 14.2, 14.5, 14.6, 14.10, 14.12, and 14.14).
Measurement: Engineering respresentatives and road designers will review roads during contract preparation and field design staking. Final inspection will ensure compliance with Road Management Objectives (RMO's).
Threshold: Less than 10 percent variation between plans and field implementation.
Corrective Action: Correct designs as needed in the pre-implementation stages. During construction, have contractor implement changes specified in design if not in compliance.
Responsible Staff: Engineering staff, Thorne Bay District Ranger approval.

Record of Results: Results recorded on road survey and designs. Internal memos noting plan-in-hand review.
Annual Cost: $3,000.
FTE Needs: 0.1 FTE.

Slope Stabilization
Objective: To determine if road design and construction have met the intent in the Final EIS to reduce risk of mass failure.
Desired Result: Road designs minimize the potential for road-related mass failures (BMP's 14.7, 14.8, 14.12, and 14.20).
Measurement: Engineering representatives and road designers will review roads during contract operations with assistance from the soil scientist or geotechnical engineer as needed. Final inspection will ensure compliance with road design standards.
Threshold: All changes between plans and implementation.
Corrective Action: Correct designs as needed in the pre-implementation stages. During construction, have contractor implement changes specified in design if not in compliance.
Responsible Staff: Thorne Bay District Ranger final approval.
Record of Results: Results recorded on road survey and designs. Also on memo noting inspections or findings of soil scientist or geotechnical engineer.
Annual Cost: $3,000
FTE Needs: 0.1 FTE

Erosion Control
Objective: To minimize erosion of sand sedimentation from timber harvest and road construction and maintenance activities.
Desired Result: Road survey and design standards which minimize the risk of soil erosion and sedimentation to streams, as outlined in the Final EIS (BMP's 13.13, 13.16, 13.17, 14.5, 14.11, 14.16, 14.17, 14.18, 14.20, 14.22, and 14.26).
Measurement: Engineering representatives and road designers will review roads during and following contract operations, with assistance from a soil scientist when needed. Periodic survey following close of operations will be scheduled by the soil scientist.
Threshold: Erosion control methods in place 90 percent of the time.
Corrective Action: Correct designs as needed in the pre-implementation stages. During sale operations, have contractor implement changes specified by designs if not in compliance.
Responsible Staff: Engineering staff and soils staff (postharvest).
Record of Results: Results recorded on daily diaries prepared by the engineering representative. Following sale operations, results recorded by soil scientist in follow-up reviews.
Annual Cost: $3,000
FTE Needs: 0.1 FTE.

Log Transfer Facilities

Petroleum Spills
Objective: To ensure petroleum product spills do not affect the marine waters.
Desired Result: Facility design and implementation will prevent fuel spillage from entering nearby waters.
Measurement: Routine observation for an oil sheen as required in the EPA 402 permit. Compliance with SPCC plans as specified in Long-Term Contract.
Threshold: Evidence of oil sheen on surface of water.
Corrective Action: Suspend operations and remedy the situation.
Responsible Staff: Sale administrator, field engineer, and contractor.

Record of Results: Daily diaries of either field inspector.
Annual Cost: $3,000.
FTE Needs: 0.1 FTE.

Water Quality and Fish Habitat

Stream Buffers for Tongass Timber Reform Act
Objective: To ensure compliance with TTRA.
Desired Result: A minimum 100-foot buffer is maintained to protect water quality and stream habitat in all Class I streams, and Class II streams flowing into Class I streams, which are in close proximity to a timber harvest unit (BMP's 12.6, 12.7, and 13.15).
Measurement: Spot check 20 percent of all units within close proximity to anadromous fish streams, for compliance with TTRA. Field verification would occur prior to timber harvest.
Threshold: Minimum 100-foot buffer.
Corrective Action: Prevent implementation until a minimum buffer width can be assured.
Responsible Staff: TNB RD timber layout and sale administration employees.
Record of Results: Sale layout cards for units and daily diaries for sale administrators.
Annual Cost: $6,000
FTE Needs: 0.2 FTE

Stream Buffers for Streams Not Covered by TTRA
Objective: To ensure protection of water quality streams.
Desired Result: Protection of all Class II and Class III streams, as outlined in the AHMU handbook (FSH 2609.22) (BMP's 12.6, 12.7, and 13.15). Twenty percent of units with these types of streams will be checked annually. Stream protection outlined on unit cards will be checked against Long-Term Contract specifications as implemented. Phase III cards may be reviewed as well.
Measurement: Specialists will spot check up to 20 percent of the units offered for sale each year. Where units cross these types of stream classes, log suspension is required in the timber sale clauses and yarding occurs away from the V-notches to minimize soil disturbance.
Threshold: Ten percent of units which required AHMU buffers have not implemented protection measures.
Corrective Action: Stop implementation and resolve among layout, sale administrator, and timber sale operator. If not resolvable at the field level, elevate to Forest Service representative and contract officer representative.
Responsible Staff: TNB RD timber layout and sale administration employees.
Record of Results: Harvest unit folders for units prepared by layout employees, or daily diaries prepared by engineering representatives and sale administrators.
Annual Cost: $3,000
FTE Needs: 0.1 FTE

Wildlife

Eagle Nesting Habitat
Objective: To ensure the minimum 330-foot buffer is maintained around eagle nest locations as stated in the Final EIS.
Desired Result: Protection of eagle nest locations.
Measurement: During management activities, observe nest use on nests close to the Project Area.

Threshold: Management activities encroach on the 330-foot minimum buffer or when these activities cause eagle nesting to cease.
Corrective Action: If it appears eagle nesting activity is disrupted due to management activities, consult with ADF&G and USFWS to resolve potential problem.
Responsible Staff: TNB RD sale administrator and wildlife specialist.
Record of Results: Sale administrator may record eagle use on the daily diary forms. Specialist doing periodic checks will be responsible for preparing short memo recording findings at nest sites.
Annual Cost: Ongoing activity for sale administration. Site visits by wildlife specialists would be $3,000 per year during active logging operations.
FTE Needs: 0.1 FTE.

Wildlife Islands and Snag Patches
Objective: To ensure wildlife islands and snag patches are located in units as stated in the Final EIS.
Desired Results: Maintain biodiversity and adequate distribution of snags.
Measurement: Visually inspect appropriate units after harvest is completed to ensure wildlife islands and snag patches are reserved per unit card direction as outlined in the Final EIS.
Threshold: Less than 10 percent of the proposed wildlife islands or snag patches are left in the harvested unit.
Corrective Action: Consult with Thorne Bay District Ranger.
Responsible Staff: TNB RD wildlife staff.
Record of Results: Memo to monitoring files.
Annual Cost: Ongoing business; no extra cost.
FTE Needs: Zero

Beach Fringe, Estuary Fringe, and Riparian Habitat
Objective: To ensure that harvest unit boundaries are located accurately for harvest units in close proximity to the beach or estuary fringe and which have unit cards (Appendix D) which specify that these units will be avoided. This would also ensure that areas intentionally left as travel corridors are protected.
Desired Result: Maintain wildlife habitat as outlined in the Final EIS.
Measurement: Units which were noted as adjacent to a protected travel corridor, estuary, or beach fringe will be reviewed. Twenty percent of units laid out each year will be spot checked for conformance with unit card design guides for these specific habitats.
Threshold: More than 10 percent of the units spot checked deviate from wildlife concerns stated on cards.
Corrective Action: If for some reason the landing or boundary locations are not feasible, the layout employee will contact a wildlife specialist and resolve desired changes at the time of layout. If mutual resolution is not attainable, elevate to the District Ranger.
Responsible Staff: TNB RD timber sale layout employees and wildlife biologists.
Record of Results: Harvest unit folders, as part of the presale files.
Annual Costs: Ongoing business; no extra costs.
FTE Needs: Zero

Threatened, Endangered, and Sensitive Species

Stellar Sea Lion
Objective: To provide protection of specific habitats for this species which may be located in the CPOW Project Area.

Desired Result: Minimal disturbance to marine mammal habitat located along southern tip of Grindall Island.
Measurement: Visual observation of marine mammal use of the known haulout.
Threshold: Evidence that marine mammals use the haulout less frequently.
Corrective Action: Consult with ADF&G, USFWS, and NMFS for resolution if a conflict becomes apparent.
Responsible Staff: TNB RD wildlife staff.
Record of Results: Daily diaries used for contract administration. If a conflict arises, normal correspondence between agencies would record the conflict resolution.
Annual Cost: $2,500
FTE Needs: 0.1 FTE

Trumpeter Swan
Objective: Protect wintering Trumpeter Swans.
Desired Results: Preferred swan wintering areas on Sweetwater Lake, Gold and Galligan Lagoon, and Barnes Lake are protected from disturbance.
Measurement: Visual observation of wintering swans at least once when any timber harvest or road construction occurs within one mile of Sweetwater Lake, Gold and Galligan Lagoon, or Barnes Lake between November 1 and April 1.
Threshold: Evidence that swans are avoiding available habitat because of forest management activities.
Corrective Action: Consult Thorne Bay District Ranger and SO wildlife staff if a conflict arises.
Responsible Staff: TNB RD sale administration employees and wildlife staff.
Record of Results: Sale administrator may record swan observations in daily diary forms. Wildlife specialists will prepare a short memo.
Annual Cost: Ongoing business for sale administrator and wildlife specialist.
FTE Needs: Zero

Cultural Resources

Protection of Cultural Resources
Objective: To ensure cultural resources are protected.
Desired Result: Protection of cultural resources meets requirements of the National Historic Preservation Act, as amended.
Measurement: Review timber unit cards, road cards, and project NEPA documents for cultural resources identified prior to any activities. Spot check 20 percent of units associated with protection measures. Any cultural resources discovered as a result of harvest or road-building activities would be protected.
Threshold: Evidence of impacts to cultural sites outlined for protection.
Corrective Action: Cultural resource specialist will ensure known sites are protected prior to implementation of any land-disturbing activities. Future discoveries would result in suspension of activities until mitigation/protection measures are designated jointly by cultural resources staff, the State Historic Preservation Officer, the Advisory Council on Historic Preservation, and the Thorne Bay District Ranger.
Responsible Staff: Sale layout employees, engineering and road design employees, field inspectors of timber sale operations, and other project coordinators. Cultural resource specialist is available for field inspection as needed.
Record of Results: Results of any new discovery will be recorded in the daily diary by field inspectors. Cultural resources specialist will be required to develop and maintain appropriate records for any new discovery once it has been brought to his/her attention.
Annual Cost: Ongoing business; no additional funding needed.
FTE Needs: Zero

Effectiveness Monitoring

Effectiveness monitoring seeks answers about the effectiveness of design features or mitigation measures in protecting natural resources and their beneficial uses. Monitoring records will be kept by the responsible staff.

Timber

Proportion of Timber Harvest
Objective: To ensure proportion of Volume Class Strata 6 and 7 can be met by the end of the KPC contract for each management area.
Desired Result: Management areas in proportion to comply with TTRA.
Measurement: Calculate proportion of Volume Class Strata 6 and 7 acres harvested, based on actual unit location. Compare actual unit location to the archived TIMTYP data layer for each management area (as of 11-28-90).
Evaluation: Determine if proportion of harvest is in compliance with TTRA.
Responsible Staff: Timber management staff.
Record of Results: Results documented in a memo to the Forest Supervisor.
Annual Cost: $500
FTE Needs: Zero

Timber Restocking
Objective: To ensure restocking occurs within minimum time frames stated in NFMA.
Desired Result: Adequately restocked timber stands.
Measurement: Stocking surveys at the 1st, 3rd, or 4th year.
Evaluation: Determination that stocking is adequate. Corrective action (i.e., planting, if natural regeneration is inadequate). The following is a list of units where adequate natural regeneration is a concern.

Units	Alternatives			
553-215		3		
554.2-201	2			5
579-218	2			
580-201	2	3		
580-212	2	3		5
584-220	2	3	4	5
584-226	2	3		5
584-227	2	3		5
584-252	2		4	5
585-210B	2	3	4	5
588-285	2			5
588-301	2			
588-305	2			
588-310	2	3		5
589-214			4	5
598-220	2	3		5
598-222	2	3	4	5

Responsible Staff: TNB RD silviculturist.
Record of Results: Annual restocking report (NFMA).
Annual Cost: Ongoing business; no additional funding needed.
FTE Needs: Zero

Precommercial Thinning
Objective: To ensure timber growth on high productive sites is managed for future fiber production.
Desired Result: Stands that are on high site index sites, have stand thinned at 15–20 years of age.
Measurement: Surveys of second-growth stands at 10–12 years of age to program thinning.
Evaluation: Determine and document findings of surveys at 10–12 years. Prioritize and program the appropriate stands for thinning at 15–20 years.
Responsible Staff: TNB RD staff.
Record of Results: Annual report of overall thinning and precommercial thinning to the SO.
Annual Cost: Ongoing business; no additional funding needed.
FTE Needs: Zero.

Visuals

Visual Quality
Objective: Ensure harvest units meet visual quality objectives.
Desired Results: Partial cut harvest is proposed for units 574-228 and 574-239; and boundary changes are proposed for units 551-254 and 582-215 for these units to meet visual quality objectives. Layout personnel will coordinate with a landscape architect to ensure that proposed partial cuts and unit boundary changes are adequate.
Measurement: Professional judgement of a landscape architect per the National Forest Landscape Management Handbook (USAD Forest Service 1977b).
Threshold: All units will meet visual quality objectives.
Responsible Staff: TNB RD timber staff with assistance from a landscape architect.
Record of Results: Sale layout card with documentation of coordination with a landscape architect.
Annual Cost: Ongoing business; no additional funding needed.
FTE Needs: Zero

Roads

Road Use Post Sale
Objective: To determine if RMO's for road use after timber harvest are reflected by actual use.
Desired Result: Resources are protected or managed as outlined in the Final EIS. Of particular concern is the road construction into the Sarkar Lakes area for units 553-221 and 553-222 and the road construction into the Paul Young Creek area.
Measurement: Periodic visits of road closures during the months of May-November.
Evaluation: Determine if use is occurring, whether RMO's are being met, and whether road closures are implemented.
Responsible Staff: TNB RD timber staff, with assistance from recreation and wildlife specialist, as needed.
Record of Results: Memo documenting the findings of the periodic visits completed after each visit.
Annual Cost: $6,000
FTE Needs: 0.2 FTE

Log Transfer Facilities

Bark Accumulation
Objective: To minimize overall effect on the marine environment from transfer of logs to salt water.
Desired Result: Bark accumulation below active LTF's is less than 10 cm depth and one acre extent thresholds in the Alaska Timber Task Force construction guidelines.
Measurement: Diving and sampling transects as required by Corps of Engineers permit.
Evaluation: Evaluate dive results in light of all the Alaska Timber Task Force guidelines.
Responsible Staff: Sale administrators during sale operations, and Land and Minerals staff for post-harvest testing.
Record of Results: Dive records and memo analyzing dive results. Possible recommendation for future design and use of LTF's.
Annual Cost: $20,000 every year, for five sites.
FTE Needs: 0.1 FTE.

Water Quality and Fish Habitat

An effectiveness monitoring program is being developed on a forestwide basis in consultation with the State of Alaska. Once developed, it may or may not be applied to the CPOW Project Area. If the sale is not included, another area similar to the CPOW Project Area would be monitored; results will be applicable to future planning areas.

Stream Buffers for Windfirmness
Objective: To determine if buffers left for protection of stream habitat and water quality remain windfirm.
Desired Result: Buffers standing as planned during layout and implementation.
Measurement: Periodically spot check buffers following harvest for width and condition using field transects and photogrammetry.
Evaluation: Determine if buffers are largely intact and within 10 percent of prescribed width. Note recommendations for future buffer design to improve protection of habitat and water quality.
Responsible Staff: TNB RD fisheries and wildlife staff.
Record of Results: Note findings and recommendations in memo.
Annual Cost: $2,000
FTE Needs: Zero

Stream-Crossing Structures
Objective: To determine if stream-crossing structures permit the passage of fish on Class I streams.
Desired Result: Fish passage occurs.
Measurement: For all Class I stream crossings, check for presence of fish above and below the site. This should be done during operations and post-harvest.
Evaluation: Evaluate stream-crossing structure for impedance or ease of fish passage. Note recommendations for improving installation or maintenance of said structure.
Responsible Staff: TNB RD fisheries staff.
Record of Results: Note finding (via memo) of site visits and recommendations.
Annual Cost: $2,500
FTE Needs: 0.1 FTE

Wildlife

Sitka Black-tail Deer
Objective: To determine if deer hunting harvest levels change because of forest management operations.
Desired Result: Deer harvest levels remain at the 1990 level, assuming there are no other major changes in populations (e.g., severe winterkill).
Measurement: Joint analysis by ADF&G and Forest Service wildlife specialists of deer harvest ticket data.
Evaluation: If there is apparent deviation from past harvests, assess known factors and determine if deviation can be correlated to forest management operations, or if other factors might be equally responsible (weather, season changes, etc.).
Responsible Staff: TNB RD wildlife staff and ADF&G biologists.
Record of Results: Prepare a brief report from both agencies.
Annual Cost: $3,000
FTE Needs: Zero

Cultural Resources

Prevention of Vandalism
Objective: To protect known sites and any discovered cultural locations from vandalism.
Desired Result: Cultural resource locations which occur within the Project Area are protected from vandalism.
Measurement: Periodic visits to known sites to ensure disturbance has not occurred. Photographs, videos, and drawings will be completed for baseline information.
Evaluation: Discovery of disturbance would result in notification of Forest archaeologist, District Ranger, and appropriate law enforcement personnel.
Responsible Staff: Cultural resource specialists.
Record of Results: Normally none, unless a violation occurs.
Annual Cost: $6,000
FTE Needs: 0.2 FTE.

Cave Resources

Prevention of Damage
Objective: To protect known cave resources from damage resulting from timber harvest activity and determine if implemented protection measures were effective.
Desired Results: Water flow patterns and other cave-specific resources are not impaired.
Measurement: Check 10 percent of harvested units that had cave resources to verify if the protective measure maintained water flow pattern.
Evaluation: Water flow pattern has not introduced sediment that could damage cave.
Responsible Staff: Forest geologist.
Record of Results: Diaries for sale administrators and memo to Forest Supervisor from the Forest geologist.
Annual Cost: $2,000
FTE Needs: Zero

Validation Monitoring

Validation monitoring is conducted to show if the assumptions or models used in planning are correct. It is usually carried out at the Regional level in conjunction with research. Validation monitoring may or may not occur within the CPOW Project Area since this type of monitoring is built into a Forestwide Action Plan.

Chapter Three

The Affected Environment and Effects of the Alternatives

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Affected Environment and Effects of the Alternatives

Introduction

This chapter presents information about those aspects of the environment that may be affected by timber harvest and roadbuilding activities in the proposed alternatives. The "Affected Environment" portion of each resource section describes the current condition of the resource, trends related to its status, and relevant characteristics that may be subjected to impacts from the alternatives. The "Effects of the Alternatives" portion of each section presents the direct, indirect, and cumulative effects (or impacts) of activities under the alternatives. Thus, this chapter combines into a single chapter information that in many Environmental Impact Statements appears in separate chapters (generally called Ch.3-Affected Environment and Ch.4-Environmental Consequences). This chapter provides the basis for the Comparison of the Alternatives section in Chapter 2.

The affected resources are presented in the following sequence:

Physical and Biological Resources

- Air Quality
- Old-Growth and Biodiversity
- Threatened and Endangered Species
- Forest Pests
- Soils (and Wetlands)
- Water Resources
- Fisheries
- Timber and Vegetation
- Wildlife
- Cave Resources

3 Environment and Effects

People and The Forest
- Visual Resources
- Recreation
- Cultural Resources
- Subsistence
- Social and Economic Environment
- Transportation and Facilities
- Land Status

Incomplete or Unavailable Information

There is less than complete knowledge about many of the relationships and conditions of wildlife, fish, forests, jobs, and communities. The ecology, inventory, and management of a large forest area is a complex and developing science. The biology of wildlife species prompts questions about population dynamics and habitat relationships. The interaction of resource supply, the economy, and communities is the subject matter of an inexact science.

The interdisciplinary team (IDT) examined the data and relationships used to estimate the effects of the alternatives. There is a substantial amount of credible information about the topics of this EIS, and the basic data and the central relationships are well established.

When encountering a gap in information, the IDT concluded that the missing information frequently would have added precision to estimates or better specified a relationship. However, the basic data and central relationships are sufficiently well established in the respective sciences that the new information would be very unlikely to reverse or nullify understood relationships. Thus, new information would be welcomed and would add precision, but it was not essential to a reasoned choice among the alternatives as they are constituted.

Analyzing Effects

Effects are quantified (where possible), although qualitative discussions may also be included. The means by which any identified potential adverse effects will be reduced or mitigated are described in detail in Chapter 2.

Environmental consequences are the effects of implementing an alternative on the physical, biological, social, and economic environment. *Direct* environmental effects are defined as those occurring at the same time and place as the initial cause or action. *Indirect* effects are those that occur later in time or are spatially removed from the activity but would be significant in the foreseeable future. *Cumulative* effects result from the incremental effects of actions when added to other past, present, and reasonably foreseeable future actions, regardless of what agency (Federal or non-Federal) or person undertakes such other actions. Cumulative effects can result from individually minor but collectively significant actions taking place over a period of time.

The reasonably foreseeable time frame over which the both indirect and cumulative effects are estimated for the purposes of this analysis to be until the end of the Ketchikan Pulp Company (KPC) Long-Term Contract (the year 2004). This determination of reasonably foreseeable is based on the time frame of the KPC contract commitment (Appendix A).

The cumulative effects analysis in this document considers the Tongass Land Management Plan (USDA Forest Service 1979a, 1986a), and the ten year timber sale

action plan referenced in Appendix A, which is used to project the volume range to be harvested in each operating period through the end of the KPC contract. The alternatives considered in this EIS present various site-specific means of achieving part of the schedule developed in the ten year timber sale action plan. As a result, the cumulative effects do not depend entirely on the alternatives presented in this EIS. Rather, they include what might be expected under the direction detailed in the TLMP and the projected schedule in the ten year timber sale action plan. The decisions made in the forest planning process represent long-range direction for the management of the Tongass National Forest for the duration of the plan.

The cumulative effects projected under any of the action alternatives are subject to changes when the TLMP Revision is complete. Decisions made during the revision process can provide for significant changes in management emphasis in any given portion of the National Forest. Cumulative effects as analyzed in this document include both the effects of this project and those projected by the TLMP Draft Revision, Alternative P.

The following assumptions were made to assess the reasonably foreseeable effects to the year 2004. These assumptions reflect current management and technology of national forests and provide a uniform approach to estimating effects of timber harvest and road construction.

- Laws, standards, guidelines, and Best Management Practices (BMP's) for resource protection would be followed. These requirements are expected to be at least as stringent in the future as they are today.

- Timber sale planning would occur in an interdisciplinary fashion.

- All acres of suitable commercial forest land would be equally subject to impacts.

- The no-action alternative would represent only a delay in implementing the TLMP and, based on volume projections in the ten year timber sale action plan, foreseeable cumulative effects would begin to occur before 2004.

- Future effects on resources from timber harvest and road construction would be similar to impacts projected for current alternatives.

Potential adverse environmental effects which cannot be avoided are discussed. Unavoidable adverse effects may result from managing the land for one resource at the expense of the use or condition of other resources. Many adverse effects can be reduced or mitigated by limiting the extent or duration of effects. Mitigation measures within standards and guidelines are specified for project activities to be implemented under the alternatives. These are discussed briefly throughout the chapter, and in detail in Chapter 2.

Short-term effects are those that occur annually or within the first ten years of project implementation. *Long-term productivity* refers to the capability of the land and resources to continue producing goods and services for 50 years and beyond.

Irreversible commitments are decisions affecting non-renewable resources such as soils, minerals, plant and animal species, and cultural resources. Such commitments of resources are considered irreversible because the resource has deteriorated to the point that renewal can occur only over a long period of time or at a great expense, or the resource has been destroyed or removed. The gradual decline in old-growth habitat

or significant loss of soil productivity would be considered irreversible commitments. Land-use designations allowing land-altering activities were established by the Forest Plan, but the actual commitment to develop, use, or affect non-renewable resources in the CPOW Project Area was made during the development of this project.

Irretrievable commitments represent opportunities foregone for the period during which resource use or production cannot be realized. These decisions are reversible, but the production opportunities foregone are irretrievable. An example of such commitments is the allocation of land-use designations (LUD's) that do not allow timber harvest in areas containing suitable and accessible timber lands, a decision that is made at the Forest Plan level. For the time over which such allocations are made, the opportunity to produce timber from those areas is foregone, thus irretrievable. Irreversible and irretrievable commitments resulting from this project are discussed in more detail at the end of this chapter.

Land Divisions

The land area of the Tongass National Forest has been divided in several different ways to describe the different resources and allow analysis of how they may be affected by Forest Plan and project level decisions. These divisions vary by resource since the relationship of each resource to geographic conditions and zones also varies. Four of these are used for more than one resource, and are described briefly here.

Geographic Provinces. These are seven large land areas that are distinguished by differences in ecological processes. They are defined by a combination of climatic and geographic features. Geographic provinces are used in the biological diversity and wildlife sections.

Management Areas. The 1979 Forest Plan (USDA Forest Service 1979a, as amended) divided the Tongass into 141 management areas, five of which are in the CPOW Project Area. Each management area has area-specific direction and activity schedules. The Tongass Timber Reform Act (TTRA) directed that "proportionality" (see Chapter 1, and the timber section of this chapter) be analyzed using the management areas. The 141 areas are therefore preserved in this analysis, and are used to ensure that the proportionality requirement is met. (See TLMP Draft Revision, Proposed Revised Forest Plan, Chapter 5, for a detailed analysis.)

Value Comparison Units (VCU'S). These are distinct geographic areas, each encompassing a drainage basin containing one or more large stream systems. The boundaries usually follow watershed divides. The Tongass contains 867 VCU's; 27 are found in the CPOW Project Area. They are used to describe the locations of specific resources in the Project Area.

Wildlife Analysis Areas (WAA's). These are Forest Service land divisions that correspond to Minor Harvest Areas used by the Alaska Department of Fish and Game. Approximately 190 apply to the Tongass and 7 to the CPOW Project Area. They are used in the Subsistence, Fisheries and Wildlife sections.

Geographic Information System

The Tongass National Forest has developed a computerized geographic information system (GIS) which was used for the development of this project. The GIS is a large data base, containing information on many of the resources of the Forest. Much of the data consists of map "layers," each representing a particular resource or attribute (such as vegetative species, soil types, or recreation places). This system makes it possible to do spatial analysis of alternatives and effects, and to rapidly display

resource information in map format. Numerical data can also be stored, displayed and analyzed.

General Project Area Description

The Project Area is mountainous, often rising abruptly from sea level to several thousand feet. Elevations of forested areas extend up to approximately 2,000 feet in the Project Area.

Climate and Precipitation

The configuration of the coastline, the warm Japanese ocean current, and the high coastal mountains provide the factors necessary to produce abundant rainfall. Storms and moderate to heavy precipitation occur year round, but most commonly from September through November. The abundant moisture feeds numerous streams, rivers, and lakes.

The CPOW Project Area has a maritime climate, resulting from the moderating influence of the Pacific Ocean. In the summer, this provides a cooling influence, while in winter, temperatures are warmer than would be expected for these latitudes. Normal temperatures range from the mid-40's to the mid-60's in the summer, and from the high teens to the low-40's in the winter. During the warmer months, temperatures are highest inland and lowest along the coasts, while in the colder months, the reverse is true.

The CPOW Project Area has complete cloud cover about 85 percent of the year. October is generally the wettest month. High precipitation persists through the middle of November when intermittent snowfall occurs. Snowfall varies according to elevation and distance inland from the coast. Snow accumulation below 500 feet elevation is short-lived, generally melting off within a few days, due to warmer temperatures and rain.

Table 3-1 shows mean annual summer and winter temperatures, precipitation, and snowfall for portions of Prince of Wales Island, where the CPOW Project Area is located.

Table 3-1
Mean Yearly Summer and Winter Temperatures, Precipitation and Snow Accumulation for Four Communities on Prince of Wales Island

Recording Station	Mean Summer Temperature*	Mean Winter Temperature*	Mean Precipitation**	Mean Snow**
Cape Pole	52.8	33.8	106.13	51.3
Coffman Cove	55.0	31.2	79.07	67.6
Craig	55.0	34.8	106.47	35.7
Hollis	56.6	33.7	109.69	17.0

* Temperatures are in degrees fahrenheit
** Precipitations are in inches
SOURCE: Alaska Climate Center Technical Note No. 3. 1986.

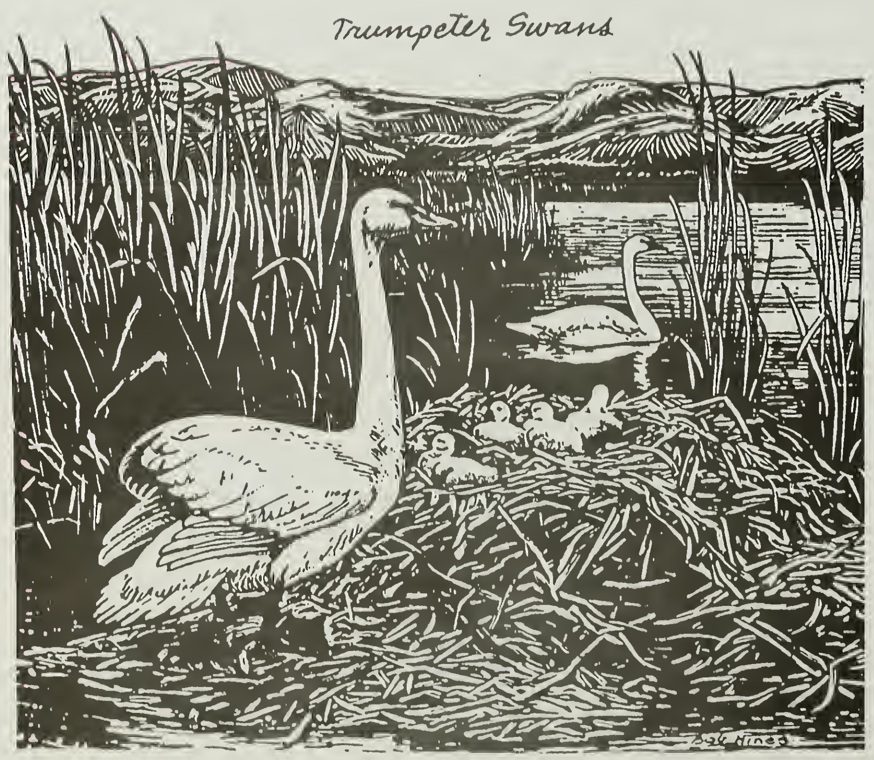
Other Characteristics

The forests, shorelines, streams, and rivers of Southeast Alaska provide habitat for over 300 species of birds and mammals, including both nongame animals and animals such as black bear, Sitka black-tailed deer, moose, wolf, mountain goat, beaver, otter and marten. Many of these are found in the Project Area. The coastline provides an ideal habitat for a large population of bald eagles, and wetlands provide nesting habitat for many waterfowl.

A highly productive marine environment includes an abundance of marine mammals, halibut, herring, and hundreds of shellfish. Both resident and anadromous fish are found within and adjacent to the Project Area, including four species of Pacific salmon, Dolly Varden, and trout.

Site-specific information on biological resources in the Project Area follows in various sections of this chapter.

Trumpeter Swans



AIR QUALITY

Affected Environment

Although there is little scientific information on the baseline air quality of the CPOW area, the air quality of the region is generally good. Exchange of air typically comes from relatively pollution free air off the Gulf of Alaska. Local sources of airborne particulates include vehicle emissions, dust, residential and commercial heating, and other sources in Thorne Bay and other small communities, and a limited amount of timber site preparation burning.

The State of Alaska Department of Environmental Conservation has the primary responsibility for attainment and maintenance of Ambient Air Quality Standards under the provisions of the Clean Air Act (see TLMP Draft Revision 1991a for related air quality discussion). The entire Project Area is a Class II airshed and does not have specific attainment criteria under the Clean Air Act.

Effects of the Alternatives

There is presently little information on the possible effects of ambient air quality on forest resources in Southeast Alaska. Forest health monitoring recently initiated under a national resource program includes air resource related parameters. Methods of conducting inventories are being developed to address this information need. Monitoring of baseline resource conditions on the forest is being conducted at this time.

It is unlikely that the proposed action alternatives would significantly change air quality conditions. Direct air quality effects from forest management activities are temporary and limited in nature, resulting in dust and vehicular emissions from logging operations and smoke from a very limited prescribed fire program. Smoke from prescribed fires is managed by developing burning plans and prescriptions to minimize environmental effects upon air quality.

The proposed action would result in a continued supply of raw wood products to the Ketchikan Pulp Company mill at Ketchikan. This would indirectly affect air quality in the immediate area. The likely result will be a continuation of the existing local ambient air quality.

The long-term and cumulative effects of the proposed action alternatives upon air quality are unknown.

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OLD GROWTH AND BIODIVERSITY

Key Terms
Biodiversity - The variety of lifeforms in an area **Canopy** - uppermost layer of foliage in the forest **Edge** - boundary between two distinct ecosystems, such as between forest and musket **Forage** - to search for food **Snag** - standing dead tree **Viable Population**- a population with the estimated numbers and distribution of reproductive individuals to maintain the population over time

Affected Environment

Old-Growth Forest

Most of the commercial forest land in the Tongass National Forest that has not been previously harvested and has been undisturbed for centuries is considered old growth. The definition of old-growth forest varies by habitat and includes such factors as age and size of trees, spacing, snags (standing dead trees), canopy layers and structure, and the amount of down material (USDA Forest Service 1991a).

Old-growth stands have an uneven appearance because they contain trees of many ages, sizes, and condition, and contain numerous dead tops and snags. Based on past forest inventories, old-growth stands are assumed to have reached an equilibrium where timber growth equals mortality (USDA Forest Service 1991a). Tree establishment largely depends on large woody debris (logs and stumps) (Harmon 1986, Harmon and Franklin 1989) and gap formation (Alaback 1988). Woody debris provides microsites for trees to grow on. Gaps created by windthrow or other disturbances allow light to penetrate to the forest floor. This process of tree death and replacement is continual; in any one year, a significant portion of the trees in individual stands are likely to blow down (Harris 1989). Thus the forest is a mosaic of older and younger trees, dynamically changing yet remaining remarkably stable as a forested ecosystem (Bormann and Likens 1979, Alaback 1988, Schoen et al. 1988, Franklin 1990).

Old-growth forest is an important source of highly valuable forest products. Sitka spruce and western hemlock are eminently suitable for the production of dissolving pulp, used in the manufacture of rayon, acetates, and other synthetic fibers. The better grade trees of these species, along with the cedars, provide some of the finest quality commercial timber for lumber.

Old-growth forest is also important wildlife habitat for old-growth associated species such as Sitka black-tailed deer, martens, black bear, Vancouver Canada geese, and

cavity or snag dependent species such as flying squirrels, woodpeckers, and owls. Many species have evolved to use the structural attributes of old-growth forests. The combination of a dense canopy with scattered openings allows forage growth under openings, while the large limbs within the canopy intercept enough snowfall to provide winter food and thermal cover for deer and other species. The large, dense stems also provide some measure of thermal insulation in the winter, as well as during cold rains in the spring and summer. Large dead or defective trees become nesting sites for martens, owls, eagles, wrens, and chickadees, as well as feeding sites for woodpeckers, sapsuckers, brown creepers, and others.

The value of old-growth forest for wildlife habitat is also thought to transcend individual stands. Large, contiguous, unfragmented blocks of old-growth forest are important to forest interior species, such as the northern goshawk and marbled murrelet. The large old-growth blocks provide expansive hunting territories and protection from predators, and promote genetic mixing among populations that would be less likely to breed if they were spatially separated by forest fragmentation. Deer use these large old-growth blocks for migration routes between winter and summer ranges.

Old-growth forests are an important but decreasing component of the temperate rain forest ecosystem. They differ in ecological function in many ways from younger, even-aged forests. Old-growth stands typically exhibit a wider variety of reproductive niches for species whose existence is thought to be old-growth dependent—including animals, understory plants, and microorganisms such as mychorrizae. It appears that these species are most successful when permitted to develop under at least a partially intact mature forest canopy.

Old-growth forests also have become important to many people for aesthetic and cultural purposes. Ancient large trees characteristic of some old-growth stands have become symbols of a pristine landscape.

CPOW Old-Growth Blocks

Within the CPOW Project Area two large, fairly intact blocks of old-growth forest remain: in the Honker Divide area (approximately 34,268 acres), and in the Staney Creek area (approximately 22,631 acres)(see Figure 1-7, Chapter 1).

Within and immediately adjacent to the Project Area are five large, unroaded blocks of old-growth forest (Table 3-2 and Figure 3-1) as identified in the roadless inventory in the TLMP Draft Revision (1991a). The Thorne River block (#511) extends beyond the south boundary of CPOW. This block contains approximately 91,530 acres. Just south of the Thorne River block is the 56,230 Karta block (#510), which also includes an additional 39,894 acres for the Karta Wilderness. The Kogish block (72,261 acres) is just west of the Karta block and south of the Project Area. In the north portion of the Project Area is the 64,956 Sarkar block, which includes the Sarkar Management Area. The Sarkar block extends east to the Sweetwater/Barnes Lake area. The last, and smallest roadless area is the Ratz block, which is 6,586 acres, located on the east shore of Prince of Wales Island, just south of Coffman Cove.

It is recognized that maintaining appropriate habitat corridors or connections between blocks of old-growth forest habitat is important to minimize isolation and gradual decline of wildlife species associated with the old-growth blocks (Harris 1984, 1985; Hunter 1990). At a minimum, inter-connectivity among all these blocks in the CPOW area is provided by smaller individual stands of old growth.

Figure 3-1 shows these large blocks of old-growth forest, while the Existing Condition Map in the separate map packet shows all remaining unharvested, old-growth, commercial forest within the Project Area.

Table 3-2
Roadless Areas and Acreage Within and Adjacent to the CPOW Project Area

Roadless Area #	Roadless Area Name	Roadless Area Acreage
509	Kogish	72,261
510	Karta	56,320
511	Thorne River	91,530
512	Ratz	6,586
514	Sarkar	64,956
Karta Wilderness		39,894
TOTAL		331,547

As the TLMP Draft Revision (1991a) is implemented, the large, unfragmented blocks within Honker Divide and Staney Creek will become increasingly fragmented, and the roadless areas will become smaller in size. This will place more reliance for old-growth values on the large unfragmented blocks within the North Prince of Wales Province, such as: Karta Wilderness, Calder Mountain, and Salmon Bay, which are reserved from harvest, and the Sarkar Management Area, which is currently not scheduled for timber harvest. In the future, inter-connectivity between these blocks could be maintained by the 500-foot beach fringe and 1,000-foot estuary buffer, as well as by streamcourse buffer strips. Other areas including stands deemed unsuitable because of unstable soils, steep slopes, economic isolation, or other factors should also be interspersed and could provide additional opportunities to connect old-growth blocks. While there has been historic timber harvest within the beach, estuary, and streamcourse buffers, these old harvest sites will mature in time and could provide travel corridors for wildlife species for genetic interchange. These projections are based on assumptions of the TLMP Draft Revision (1991a).

Biological Diversity and Viable Populations

Biodiversity

The National Forest Management Act (NMFA) defines diversity as the distribution and abundance of different plant and animal communities and species. Biological diversity, or biodiversity, refers to the variety of life in an area. It can be evaluated at different scales.

At very small scales, genetic and species diversity are considered. Genetic diversity is the sum total of genetic information contained in the genes of individual plants, animals, and microorganisms. Concern is generated when individuals of a species do not reproduce very well (such as Pacific yew) or do not show much variation among individuals. Species diversity is the most familiar level, refering to the variety of living organisms ranging from beetles to bears, from mosses to massive trees.

In managing forest ecosystems, however, it is often the larger scales that receive attention in biodiversity management. The integration of species and their environment as a functioning ecosystem (referred to as a plant association or habitat type) forms the first scale of interest. The diversity within this community is another scale of diversity. For example, muskegs (peatlands) in southeast Alaska have a different plant diversity than productive hemlock forests.

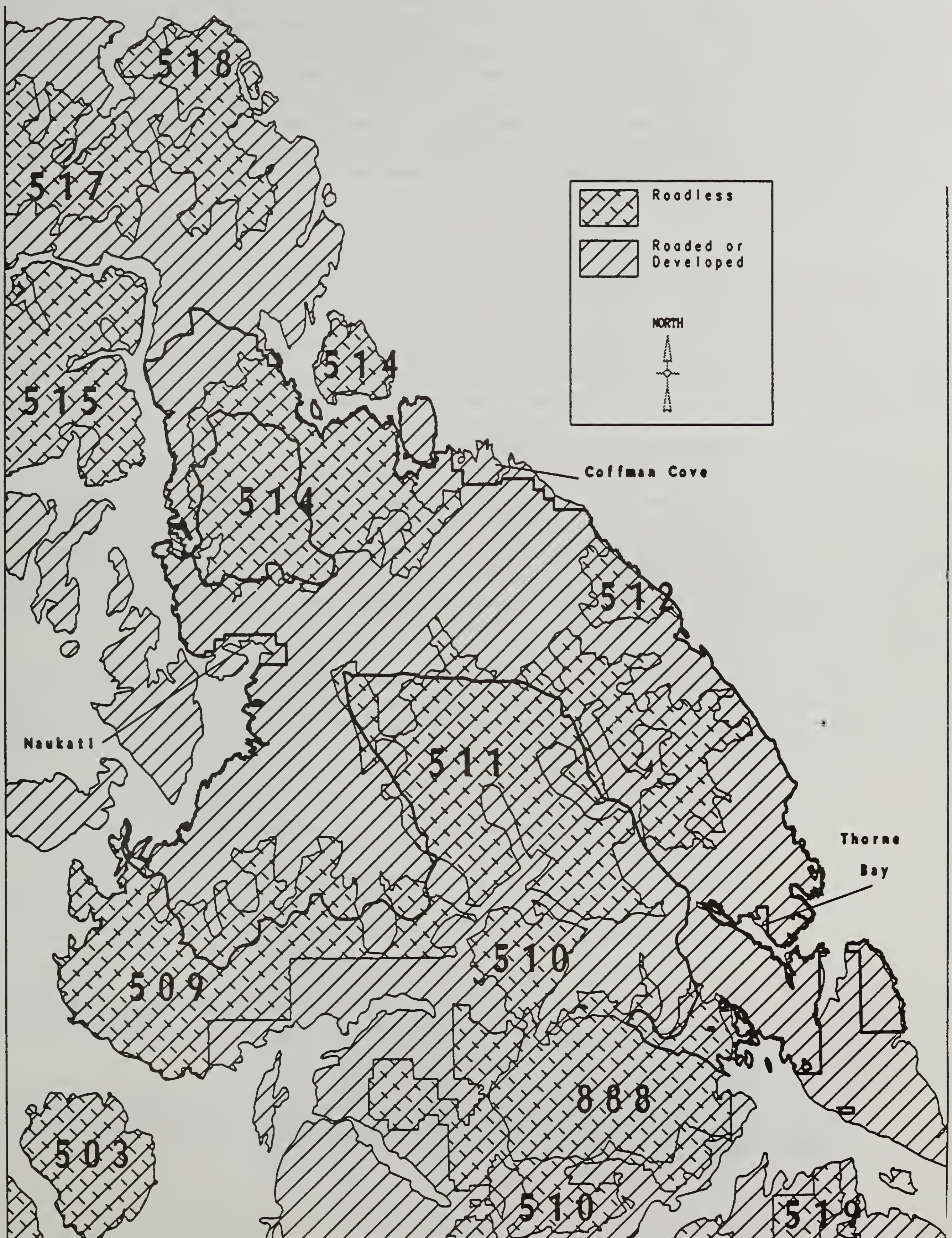
The next scale is the between-ecosystem diversity. Southeast Alaska has high between-ecosystem diversity because natural forested patches are relatively small (in comparison with Oregon and Washington, for example), and are often interspersed in a matrix of muskegs. Logging generally increases this scale of diversity, because the fragmentation of old-growth patches increases, and the subsequent young age classes of second-growth that follow are quite different from adjacent old growth.

The largest scale considered is the diversity of ecosystems across a landscape. At this scale, differences in geology—notably the limestone/marble region on northern Prince of Wales—and climate come into play. Large areas of several million acres are evaluated and subdivided into ecological provinces and subprovinces (as in the TLMP Draft Revision, 1991a). Evaluation of this scale of diversity is important for a number of reasons. Silviculturally, a plant association on limestone-derived soils may respond differently following logging than the same plant association on glacial soils. The frequency of certain forest structural patterns (size and distribution of trees) may also differ, with profound implications for wildlife habitat. Plant diversity is likely to vary, because of the soil hydrology/chemistry characteristic of limestone sites.

From the above discussion, it becomes evident that diversity must be evaluated at different levels, because ignoring scale can lead to adverse effects on ecosystem function. For years, maximizing forest fragmentation (the "staggered setting" approach) was thought to benefit wildlife, because it maximized forest edges (boundaries between ecosystems). More recent research has suggested, however, that maximizing edge can threaten forest interior conditions critical for certain species (Forman and Godron 1986, Hunter 1990).

Increasing biodiversity, therefore, should always be carefully evaluated. In forest management, it is sometimes necessary to focus on what is more limiting (e.g., large old-growth patches) or rare (e.g., possible some plant or animal species) and seek to maintain these aspects of ecosystems, rather than trying only to maximize diversity.

Figure 3-1
Old-Growth Areas Within CPOW Project Area



Viable Populations

Seen in this light, it is appropriate that fish and wildlife habitat be managed to maintain viable populations of existing native and desired non-native vertebrate species in the planning area. For planning objectives, a viable population is one that has the estimated numbers and distribution of reproductive individuals needed to ensure its continued existence, and is well-distributed in the planning area (NFMA). In order to maximize the probability that viable populations will be maintained over time, habitat must be provided to support at least a minimum number of reproductive individuals, and that habitat must be well distributed so that those individuals can interact with others in the forest planning area.

"Planning Area" for defining viable populations is the ecological province level (TLMP Draft Revision 1991a). Each smaller area within a province is not expected to independently maintain viable populations, but only to contribute to and not cause a decline of overall viable populations for the province. The Central Prince of Wales (CPOW) Project Area lies within the North Central Prince of Wales Island Ecological Province, as defined by TLMP. This province includes all of Prince of Wales north of a line from Cholmondeley Sound to Hetta Inlet. It also includes the islands of Sukkwan, Tuxekan, and Kosciusko, and numerous smaller adjacent islands.

Evaluating CPOW Biodiversity

The amount of contiguous habitat, and the extent to which similar habitats connect by corridors, are currently considered key concepts in managing for biological diversity (Harris 1984, 1985; Hunter 1990). Because of the importance of unfragmented old-growth forest patches and the role of these areas in maintaining viable wildlife populations, old-growth habitat and an analysis of patch-size effectiveness will be used in this EIS as tools to evaluate biodiversity.

The North Central Prince of Wales Island Ecological Province is comprised of 1,260,553 acres, of which 251,898 acres are designated for preservation in a natural setting under the terms of Alternative P for the TLMP Draft Revision (1991a). Two of these areas are adjacent to the CPOW Project Area: the Karta Lake Wilderness, and the Sarkar Management Area. These two large blocks of habitat could serve as major population reservoirs for plant, mammal, and bird species of the Project Area, which may be necessary in the future given previous levels of habitat alteration. In addition to these areas are the five roadless areas displayed in Figure 3-1. Inter-connectivity between the Sarkar area and the Karta area is maintained currently by the Thorne River Roadless area (#511), and the proposed Scenic/Recreation river corridor along the Thorne River and Hatchery Creek up to Sweetwater Lake.

Beach and estuary fringe and stream buffers could serve as travel corridors thoughout the Project Area. Of particular significance are the Thorne River and Hatchery Creek systems, which would be the major path for wildlife movement from the Karta Wilderness Area north throughout the Project Area.

A more detailed discussion of Tongass National Forest direction for managing biological diversity can be found in the TLMP Draft Revision, 1991a, Vol. 149, pp. 3-9–3-45.

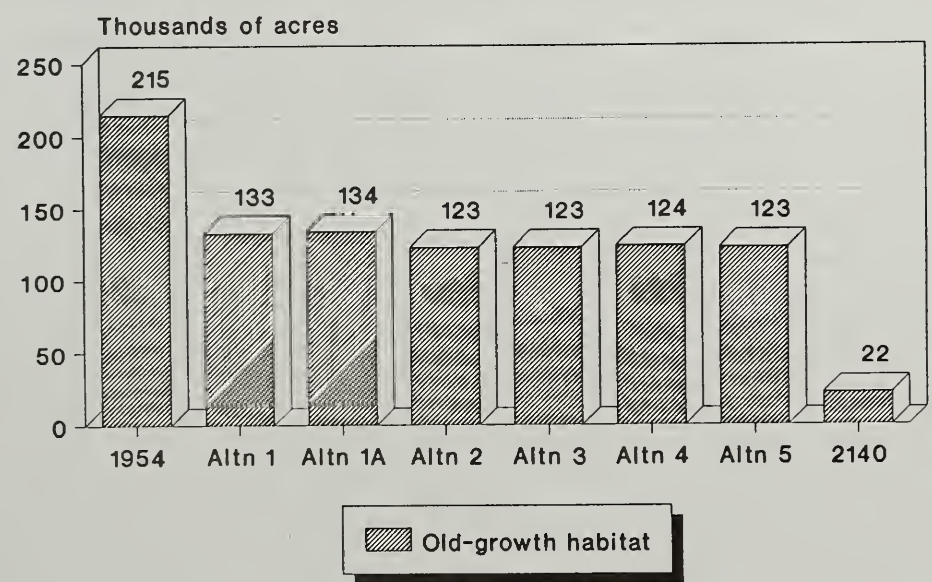
Effects of the Alternatives

Analysis conducted for the TLMP Draft Revision (1991a) indicates approximately 251,900 acres of natural setting would remain distributed throughout the North Prince of Wales Ecological Province to potentially support viable populations of Management Indicator Species (MIS). All alternatives provide areas within the Project Area that would remain connected by existing roadless areas, beach fringe and estuary fringe, stream corridors, and the myriad of muskegs, oversteepened slopes, and other areas unsuitable for timber harvest. Managed stands would change from multi-aged old-growth timber to even-aged stands of timber in early succession/understory colonization stage.

Following clearcut logging of old-growth forest, the stands that subsequently develop are even-aged (Harris and Farr 1974) and tend to contain a higher percentage of Sitka spruce and a lower percentage of the cedars. Clearcutting differs from natural disturbances in that it represents a large-scale change (up to 100 acres, typically) rather than dispersed small (1–20 acres, typically) blowdown patches. It also differs in that nearly all trees are felled, whereas in natural disturbances some trees remain standing or partially standing (Hansen et al. 1991).

There has been a national concern over the limited and dwindling supply of old-growth forest, as exemplified by the spotted owl controversy in Oregon and Washington. As the TLMP Revision is implemented, approximately 70 percent of the province will be converted from old-growth forest to successive crops of younger trees which will be harvested before they mature into old-growth forest (TLMP Draft Revision 1991a). The subsequent crops of younger trees will yield more useable wood fiber per acre. At the same time, this conversion of old-growth forest to younger stands may cause some changes in the value of certain forest products, changed value of wildlife habitat, reduced diversity of ecosystem function and composition, and changes in inherent aesthetic qualities. Figure 3-2 displays the amount of old-growth habitat that existed in 1954, the effect of proposed alternatives on existing old growth, and the effect of harvesting most of the suitable-available forest land by 2140.

Figure 3-2
Effect of Proposed Alternatives on Total Old-growth Habitat



Fragmentation and Patch Size Effectiveness

To help identify important blocks of old-growth habitat, a map was generated using Geographic Information System (GIS) that displayed all blocks of old-growth timber greater than 100 acres in size that were at least volume class 5 or greater. Higher volume classes are thought to be more valuable as deer habitat, particularly for winter thermal cover (Schoen and Kirchhoff 1990, Kirchhoff and Schoen 1987, Hanley et al. 1989). Using the "Patch Size Effective Graph" in the Deer Model as a guide (a rating of 0 has no terrestrial wildlife habitat value, a rating of 1.0 is optimum wildlife value), each block of habitat was assigned the following rating:

0 = water
0.3 = all old-growth patches less than 100 acres
0.3 = all areas previously harvested
0.3 = all areas less than volume class 5
0.5 = all areas 100–499 acres in size and greater than volume class 4
0.8 = all areas 500–1,000 acres in size or blocks over 1,000 acres that had excessive amounts of edge, and greater than volume class 4.
1.0 = all areas greater than 1,000 acres and minimal amounts of edge, and greater than volume class 4.

This procedure was completed for all alternatives and is displayed in Figures 3-3 through 3-8. Figure 3-3 represents the exsiting condition, while Figures 3-4 through 3-8 show the effect that each alternative has on the existing large blocks of high volume, old-growth forests.

A weighted average (based on the percent occurrence of each rating) was calculated for each alternative to numerically display how effective each alternative was at maintaining large blocks of old-growth. Average patch size effectiveness ratings for each alternative are shown in Table 3-3.

While no analysis was performed to assess the portion of forest edge in each block (thereby delineating interior old-growth conditions), the blocks can be compared against each other to form a relative comparison.

Table 3-3
Average Patch Size Effectiveness Rating for the Project Area

1954	Alt.1	Alt.1a	Alt.2	Alt.3	Alt.4	Alt.5
.69	.41	.41	.39	.39	.38	.38

Table 3-4 displays the acres that occurred in each "Patch Size Effectiveness" rating for each alternative.

Table 3-4
Patch Size Effectiveness Acres, by Alternative

Alternative	1.0 Patches	0.8 Patches	0.5 Patches	0.3 Patches
1	22,176	17,218	35,583	240,399
1a	22,176	17,218	36,228	239,754
2	13,345	20,842	33,767	246,468
3	11,204	23,483	35,029	244,492
4	10,164	22,470	38,290	244,488
5	12,889	20,254	36,235	245,602

1.0 = least fragmented...0.3 = lowest value for the purposes of patch size effectiveness analysis because of greatest fragmentation, low volume class, or second-growth
SOURCE: Matson 1992.

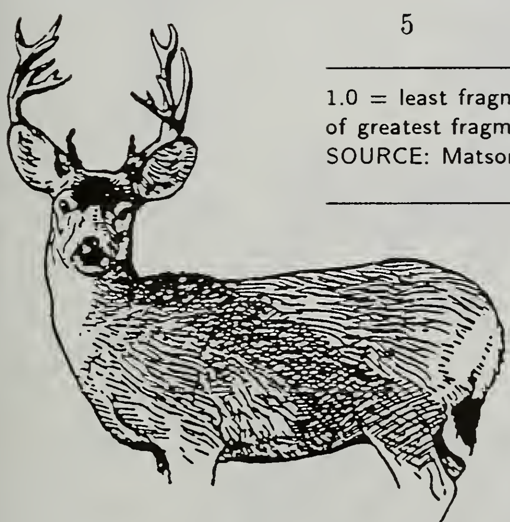


Figure 3-3
Patch Size Effectiveness, Alternative 1

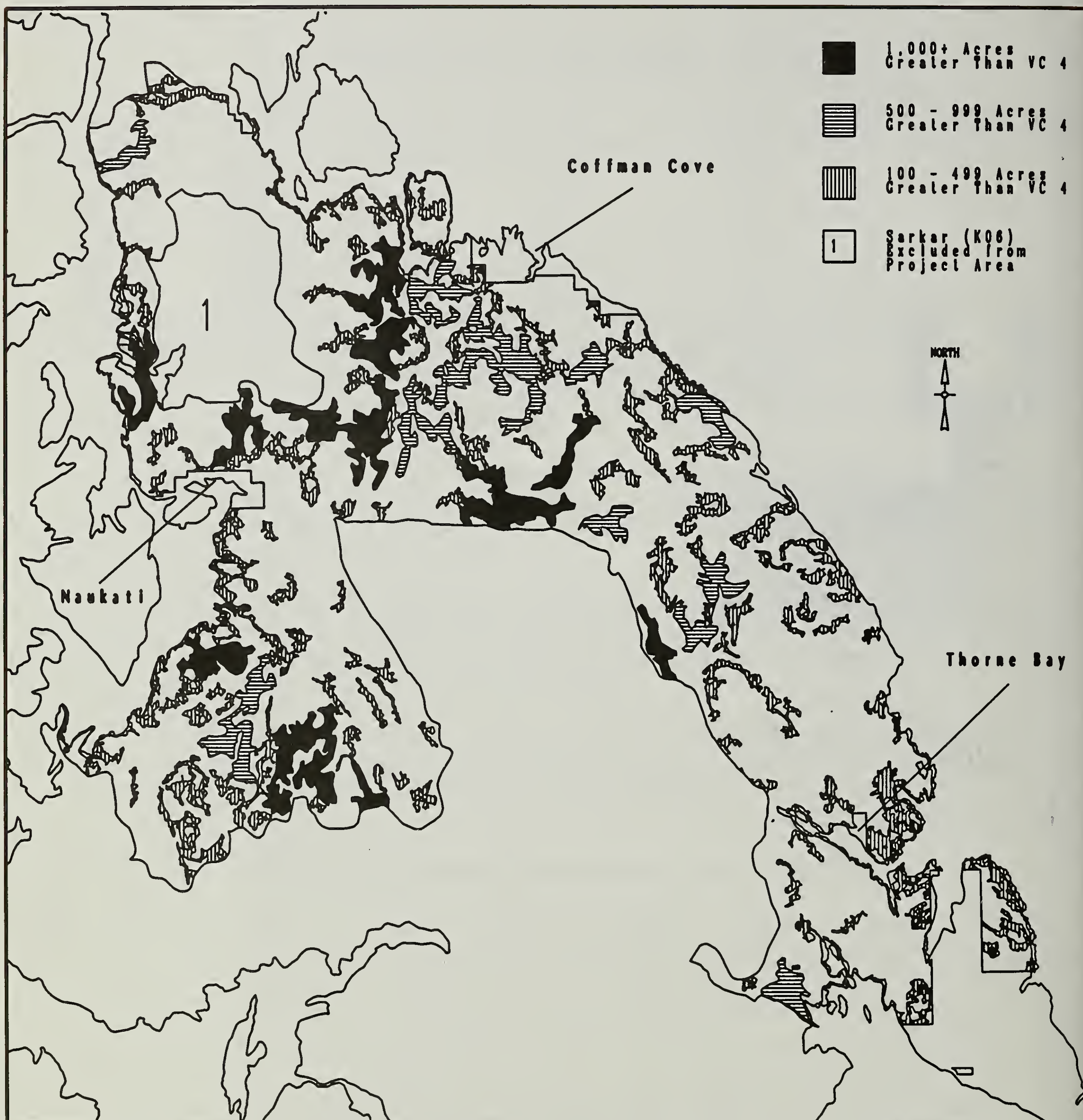


Figure 3-4
Patch Size Effectiveness, Alternative 1a

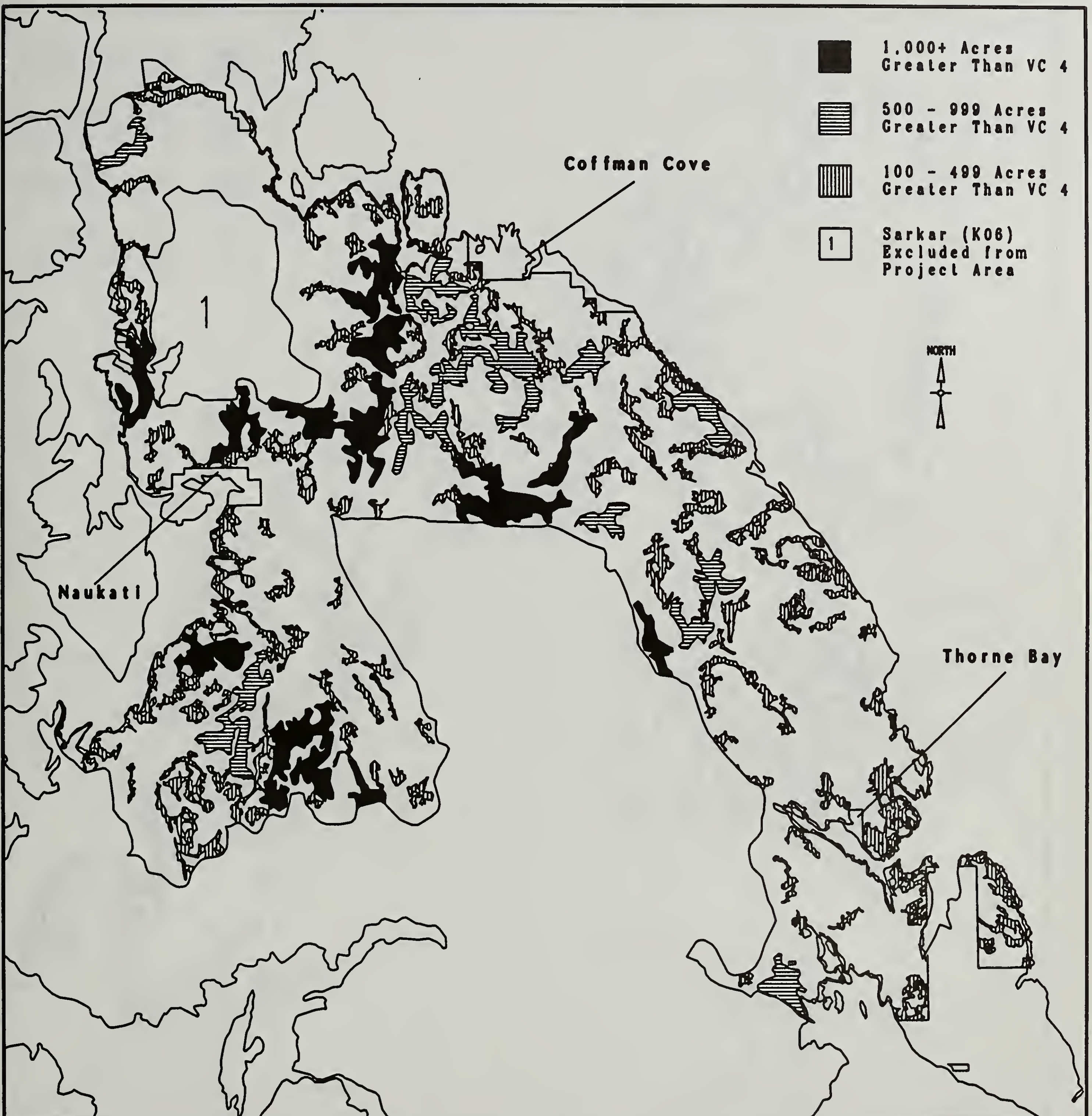


Figure 3-5
Patch Size Effectiveness, Alternative 2

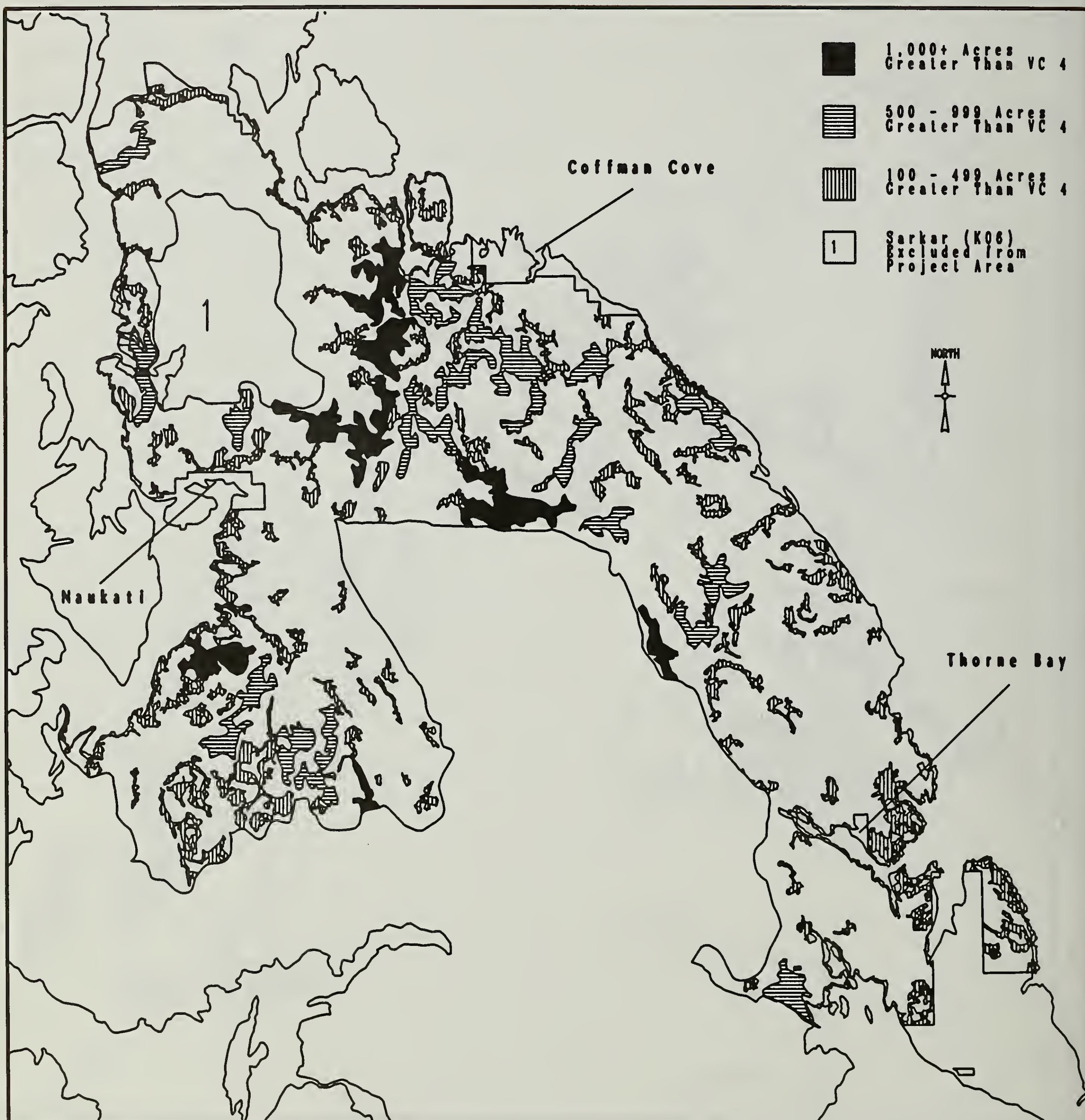


Figure 3-6
Patch Size Effectiveness, Alternative 3

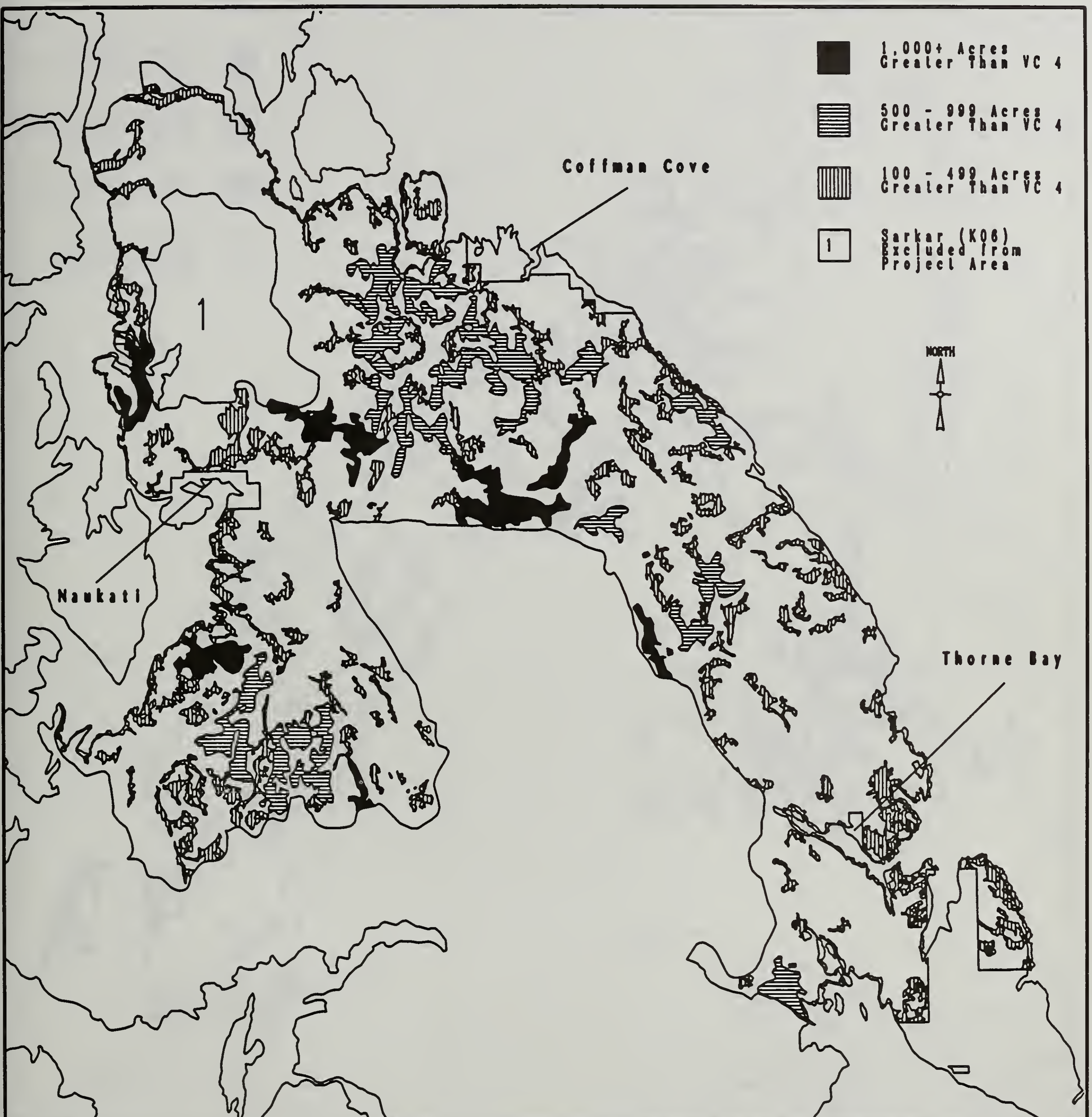


Figure 3-7
Patch Size Effectiveness, Alternative 4

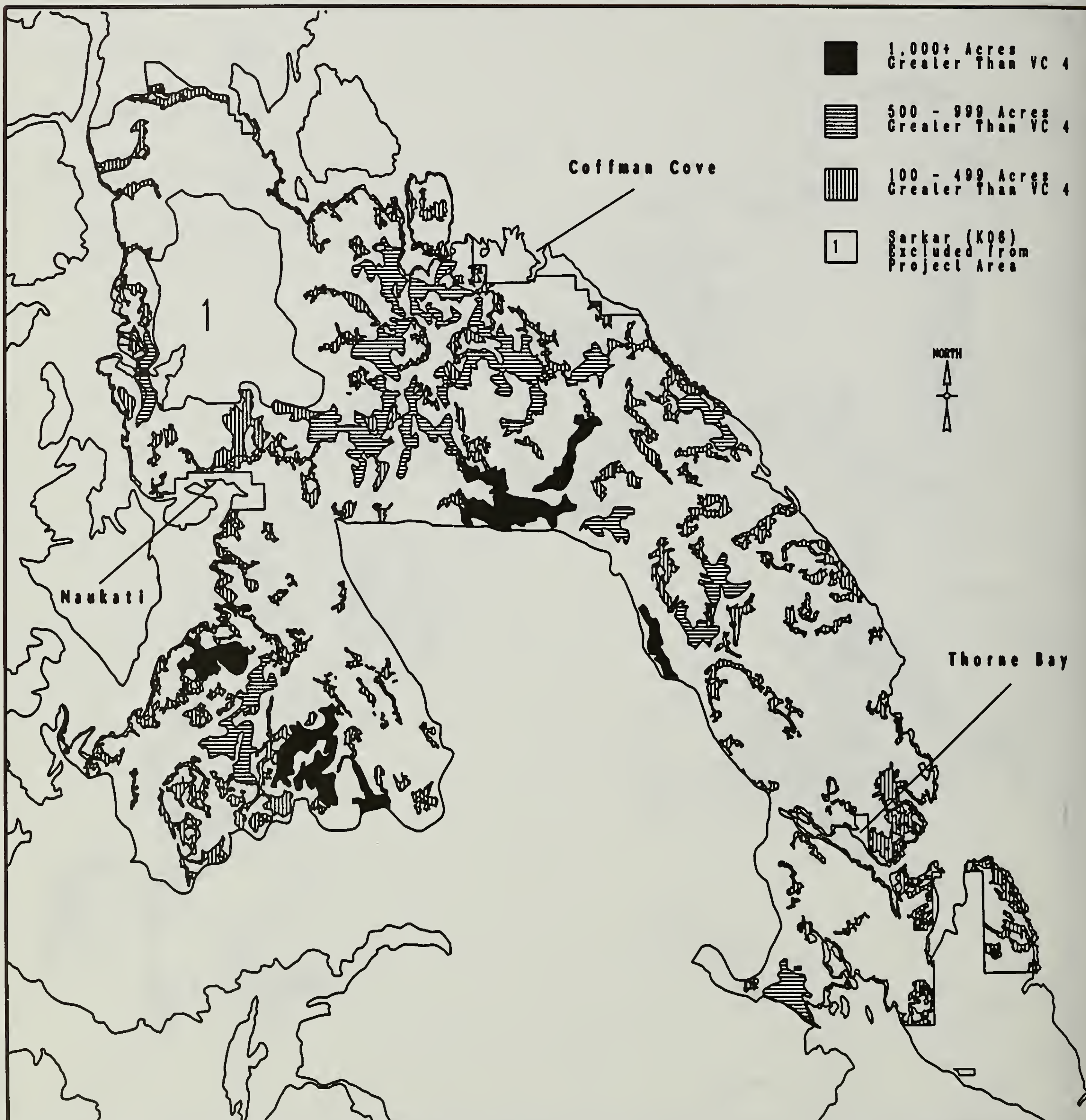
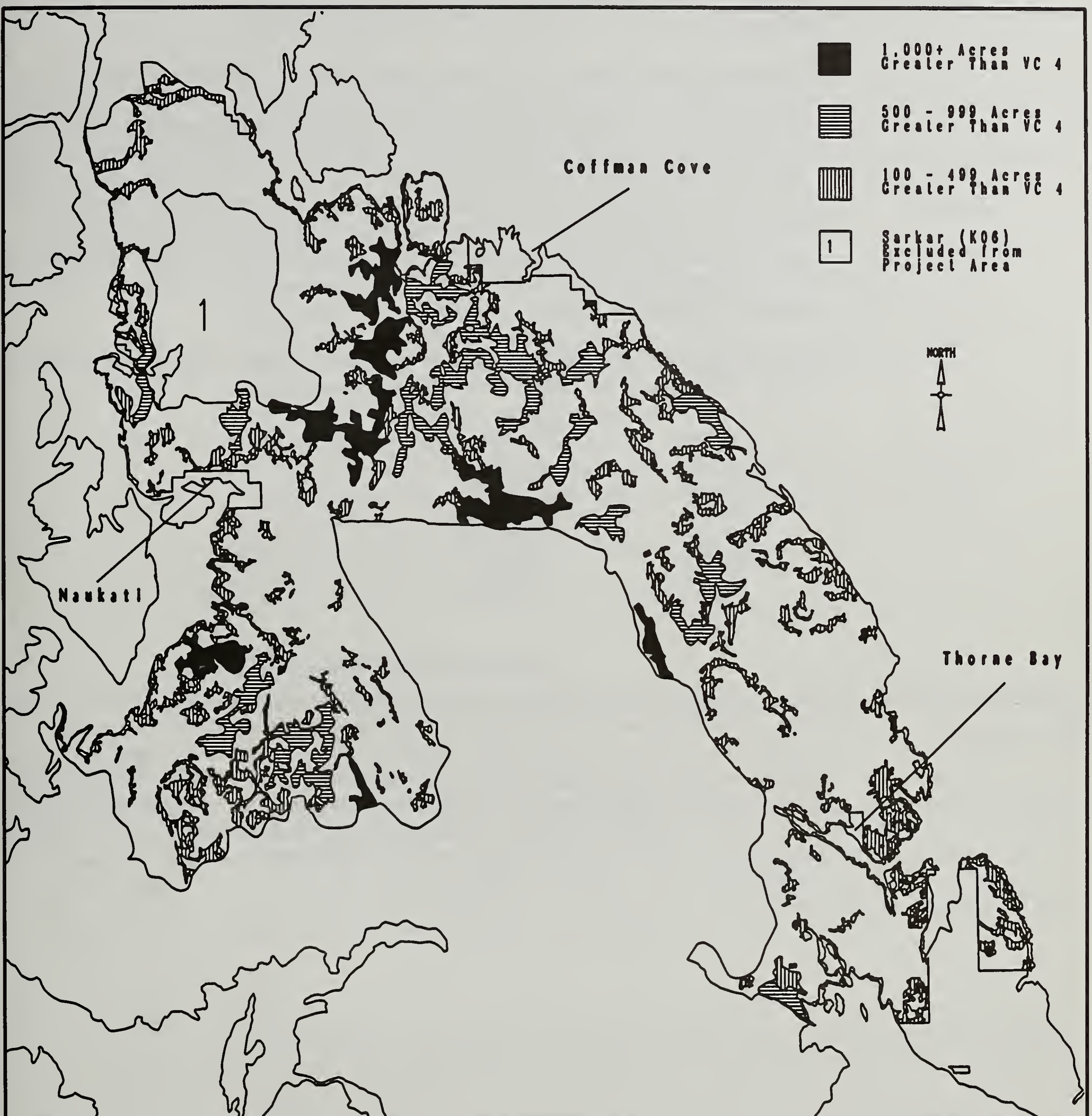


Figure 3-8
Patch Size Effectiveness, Alternative 5



Snag Abundance Analysis

TLMP Draft Revision (1991a) standards and guidelines call for maintaining a minimum of 275 snags per 100 acres of forested habitat, for cavity nesting wildlife species. An analysis was completed for all VCU's within the Project Area to determine if prior harvest has reduced the number of snags below forest standards and guidelines.

This analysis was accomplished by using snag densities for the various timber types existing within the Project Area, as determined by Noble and Harrington (1977). In evaluations, the size and species of snags were accounted for. Areas that had been previously harvested were assumed to have no snags. The maximum number of snags per acre used was eight per acre; it was assumed that more than eight snags per acre were in excess of nesting and courtship needs of the hairy woodpecker, which was the MIS chosen to represent cavity dwellers and users of snags for the CPOW Project Area. The analysis indicates that there is an adequate number of snags existing in all VCU's. However, some VCU's were identified as needing further analysis to confirm adequate distribution of snags.

Based on map and photo review, the following units will have snag patches within the unit, to maintain a good distribution of available snags:

550-230	579-222
557-201	579-223
557-202	583-227
579-212	585-215
579-213	587.1-208
579-214	588-327
	598-245

Comparison of Alternatives

Based on old-growth habitat and patch size effectiveness, Alternatives 1 and 1a would do the most to preserve the natural biological diversity of the Project Area and maintain natural ecosystem processes. Of the action alternatives, Alternatives 2 and 5 maintain the most acreage in large, high volume old-growth blocks. Alternative 4 would leave the least amount of acreage in large, high volume, old-growth blocks. The direct effects on biological diversity under all action alternatives are consistent with the amount of timber harvest allowed under implementation of TLMP (1979a, as amended).

THREATENED AND ENDANGERED SPECIES

Key Terms

Endangered - a species in danger of extinction throughout all or a significant portion of its range
Threatened - a species that is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range
Category 2 Candidate - a species or group of species being considered by the U.S. Fish and Wildlife Service for listing as endangered or threatened, but for which conclusive data is lacking on its biological vulnerability and degree of threat
Category 3 Candidate - species that are now considered to be more abundant and/or widespread than previously thought
Sensitive - species (identified by the Regional Forester) whose population viability is of concern on national forests within the region, and which may need special management to prevent their being placed on State or Federal threatened and endangered species lists
Haul out - areas of large, smooth, exposed rocks used by seals and sea lions for resting and pupping

Affected Environment

Threatened or Endangered Species

Federally listed threatened and endangered species are those plant and animal species formally listed by the U.S. Fish and Wildlife Service (USFWS) or the National Marine Fisheries Service (NMFS), under the authority of the Endangered Species Act of 1973, as amended. Candidate species are those being considered for listing as threatened or endangered by the USFWS and NMFS. The State of Alaska has an Endangered Species Law which authorizes the commissioner of the Alaska Department of Fish and Game (ADF&G) to list Alaska endangered species.

Fish

No threatened, endangered, or sensitive fish species are known to occur in the Central Prince of Wales Project Area.

Plants

No plant species known to occur in the Project Area have been determined to be threatened, endangered, or sensitive.

Other Wildlife

No endangered or threatened wildlife species are known to occur in the Project Area (Holmberg 1992). The endangered American peregrine falcon may migrate through the Prince of Wales Island area, as well as the Eskimo curlew and the Aleutian Canada goose (Holmberg 1992). The Peale's subspecies of the peregrine falcon nests on the Outer Islands west of the Project Area (Schempf 1981 and 1982). This species is not listed as endangered or threatened, but is covered by a provision of "similarity of appearance," which broadens the scope of the protection for all peregrine falcons. No harvest units for any of the alternatives are adjacent to, or include, any known nest sites of Peale's peregrine falcon.

Humpback whales and Stellar's sea lions are occasionally found in waters bordering the Project Area (Pennoyer 1992). There is a Stellar's sea lion haul out area located on the south tip of Grindall Island (at the south tip of Kasaan Peninsula). No developments are planned within 15 miles of this haul out site. A biological assessment has been prepared for peregrines, whales, and sea lions, and is found in Appendix B.

Sensitive Species

There are several species occurring within the CPOW Project Area which are classified as sensitive or as category 2 or 3 candidate species.

Prince of Wales Northern Flying Squirrel

Several subspecies of northern flying squirrel were listed as category 2 candidate species in the May 22, 1984 Federal Register (1984, cited in Amaral 1989). In a June 5, 1987, memorandum, the U.S. Fish and Wildlife Service (USFWS) recommended changing the Prince of Wales flying squirrel from a category 2 candidate species to a category 3 candidate species. According to the USFWS, the squirrel is known to be largely dependent on old-growth forest for both nesting and foraging habitat.

Old-growth habitat patches of 75–120 acres are needed to support at least one northern flying squirrel (Rosenberg and Raphael 1986); a 1,000-acre patch of old growth is assumed to provide habitat for 20–40 flying squirrels in Southeast Alaska.

Corridors of old-growth forest between habitat patches are needed to insure that the genetic pool for the northern flying squirrel is adequate and to provide for safe movement out of the area as population pressures increase. Buffer zones of streams, lakes, and beach fringe serve well as travel corridors, as do stringers of old-growth forest between habitat patches.

An Interagency Task Group evaluated the habitat requirements for flying squirrels and determined that habitat necessary to maintain viable populations would be available on Prince of Wales Island (Interagency Task Group meeting records, July 18, Sept. 1 and 8, 1988).

Marbled Murrelet

The marbled murrelet is a robin-sized seabird that is found throughout the North Pacific; the North American subspecies ranges from Alaska's Aleutian Islands to central and occasionally southern California. The marbled murrelet feeds in near-shore ocean feeding areas, inland salt waters, and occasionally inland freshwater lakes. The bird feeds below the water's surface on small fish and invertebrates.

Based on miles of shoreline having food resources and appropriate nesting area, Alaska is the major center of the marbled murrelet population in North America (Marshall 1988). Population estimates for Southeast Alaska range from 250,000 (Kessell and Gibson 1978, cited by Marshall 1988) to 50,000–75,000 (Mendenhall and McAllister 1988, cited in Marshall 1988).

The marbled murrelet is currently listed as a category 2 candidate species in Alaska. The U.S. Fish and Wildlife Service, June 1991, issued a Proposed Rule in the Federal Register to list the marbled murrelet as threatened in Washington, Oregon, and northern California; in Alaska it would remain a candidate 2 species pending further research. The bird's only known nesting sites in the Pacific Northwest and southcentral Alaska are in old-growth forests. Some ground nests have been found, but have not been verified as to whether they are kittlitez or marbled murrelet nests.

Marbled murrelet habitat requirements are not well established for Southeast Alaska, and there is a need for research on both nesting and wintering habitat requirements. However, the best available information indicates that habitat for regional marbled murrelet populations is adequate (see Appendix B).

Northern Goshawk

The goshawk is a large raptor associated with forests having tall trees and dense canopies. These features allow goshawks to hunt beneath the tree canopy, and to capture prey before the prey escapes into the trees or shrub layer. The dense canopy also provides a micro-climate that fosters a more abundant prey species population. Goshawks forage over home ranges that are typically 6,000 to 8,000 acres, though home range may be twice that size in fragmented forests (Crocker-Bedford 1991).

The northern goshawk has been listed as a category 2 candidate species for all of its range, including the Queen Charlotte subspecies which is present in Southeast Alaska. The status review is expected to be completed sometime during 1992. On August 18, 1992, Interim Guidelines for Goshawk Habitat Management were adopted by the USDA Forest Service Region 10.

There are three areas within the CPOW Project Area where goshawk nests have been confirmed: the Sarheen Goshawk management area southwest of Neck Lake, the Sarkar management area near Salt Water Lagoon, and the Hatchery management area southwest of Hatchery Lake. Nest trees have been located for the Sarheen and Sarkar areas. Two adult and two juvenile birds in the Sarkar area have been fitted with radio tagged collars. These birds are being studied by biologists as part of a cooperative interagency agreement between the Forest Service and ADF&G to better understand the habitat requirements of goshawks in Southeast Alaska. Habitat composition of the Sarheen and Hatchery Lake management areas is presented in Table 3-5.

Table 3-5
Habitat Composition of CPOW Goshawk Management Areas, in Acres

Territory	Size	Non-Forest	Low Productivity	Water	Clearcut	Volume Class 4+
Sarheen	7,632	159	2,657	189	1,353	3,274
Hatchery Lake	14,198	866	2,726	667	2,587	7,352

Trumpeter Swan

The trumpeter swan is the largest waterfowl species in the world. Its present range is only a vestige of the once vast region of North America that it frequented in both summer and winter (Bellrose 1980). Trumpeter swans breeding in Alaska spend the winter along the Pacific Coast from the Alaska Peninsula to the mouth of the Columbia River, where they take advantage of open waters of saltwater estuaries and freshwater lakes and rivers. Trumpeter swans are present in the Project Area primarily during the fall and early spring migration periods and during winter, normally from mid October to early April. The trumpeter swan is classified as a sensitive species in Forest Service Region 10.

Sweetwater and Barnes Lakes are the two most heavily used swan wintering areas within the Project Area, with more than 100 birds being observed on several occasions. Other areas where swans have been seen include: Thorne River Flats, Ratz Harbor, Karta Lake, Control Lake, Hatchery Lake, Luck Lake, Honker Lake, Gold and Galligan Lagoon, Sarkar Lake, Staney Creek Meadow, and Big Salt Lake.

It is doubtful that swans normally nest in the Project Area, but an adult swan with one young was observed on Sarkar Lake 6/26/76.

Effects of the Alternatives

Threatened or Endangered Wildlife Species

Proposed actions in each of the alternatives are not anticipated to adversely affect directly, indirectly, or cumulatively the humpback whale, American peregrine falcon, Aleutian Canada goose, Stellar's sea lion, or Eskimo curlew, in the CPOW Project Area. A biological assessment is included in Appendix B.

Sensitive or Category 2 Candidate Species

Marbled Murrelet

All action alternatives will harvest stands capable of providing nesting habitat (old-growth forests) for marbled murrelets. Table 3-46 in the Wildlife section of this chapter shows that Alternatives 2, 4 and 5 harvest seven percent and Alternative 3 harvests eight percent of the old-growth habitat in the Project Area.

Currently, insufficient evidence exists to conclude that the marbled murrelet population is likely to be adversely affected under any of the alternatives proposed in the Project Area. Based on current information, a reduction in available nesting habitat may occur. However, no significant adverse or cumulative effects on the local murrelet population is anticipated because of the large unroaded blocks of habitat that exist in and adjacent to the Project Area.

Northern Goshawk

Alternatives 1, 1a, and 2 will have no impact on the productivity of the Sarheen goshawk management area. Alternatives 3, 4, and 5 will harvest approximately 10 percent of the remaining high volume, old-growth habitat in the foraging area (Table 3-6). This harvest, when combined with the amount of harvest that has already occurred (1,353 acres), may have an effect on the productivity of this area.

Alternatives 1 and 1a will have no impact on the productivity of the Hatchery Lake goshawk management area. The impact that the other alternatives will have is extremely difficult to predict since the current nests have not been located (this territory wasn't verified until after the nest tree was cut in 1991). That is the reason the suspected Hatchery Lake area is so much larger than the Sarheen area; it was felt that the territory would shift to the east due to the available habitat and to the amount of harvest that has occurred west of the old nest site. One way to predict an effect on goshawk productivity for the Hatchery Lake area would be based on acres harvested, provided the territory is still active. Based on the amount of harvest within the suspected goshawk foraging area, Alternatives 3 and 4 would be most likely to affect productivity, and Alternative 2 would have the least impact of the action alternatives. Alternative 5 would have impacts somewhat less than 3 and 4, but more than Alternative 2. Table 3-6 presents acres of timber harvest within suspected goshawk foraging areas.

Table 3-6
Acres of timber Harvest Within Suspected Goshawk Foraging Areas

Foraging Area	Alt. 1	Alt.1a	Alt. 2	Alt. 3	Alt. 4	Alt. 5
Sarheen	0	0	0	336	335	331
Hatchery Lake	0	0	102	321	386	206

Nest areas will be protected from harvest in all alternatives, following the recently issued Interim Guidelines for Goshawk Management (USDA Forest Service 1992c). While the habitat requirements of goshawks in Southeast Alaska are not well documented, numerous studies have observed that timber harvest can adversely affect goshawks (numerous authors cited in Crocker-Bedford 1990). The Interim Guidelines for Goshawk Habitat Management will be incorporated into unit layout and design.

Trumpeter Swan

Timber harvest activity will not be in conflict with TLMP Draft Revision (1991a) standards and guidelines for trumpeter swans, since swans are not present in the Project Area when most of the timber harvest activity occurs. There is a potential for conflict when swans are migrating through the area or returning to wintering areas on Barnes Lake, Gold and Galligan Lagoon, and Sweetwater Lake. Noise from road construction, timber harvest, and hauling of logs could frighten swans away from their preferred resting and feeding areas. However, limiting timber harvest operations to periods when swans are not present will mitigate these potential impacts for the units that are within a half mile of Barnes Lake, Gold and Galligan Lagoon, and Sweetwater Lake (see Mitigation Measures, Chapter 2).

Alternatives 1, 2, and 5 do not propose any units for harvest within a half mile of Barnes or Sweetwater Lakes. Alternative 3 has 5 harvest units within a half mile, and Alternative 4 has 7 units within a half mile of Barnes Lake, Gold and Galligan Lagoon, and Sweetwater Lake.

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FOREST PESTS & DISEASES

Key Terms

Endemic - peculiar to a particular locality; indigenous
Epidemic - rapid spread or sudden prevalence of a disease
Phloem - the tissue in plants that conducts foods such as sugar
Xylem - the tissue in plants that conducts water and substances in solution
Sapwood - the softer part of wood, between the inner bark and the heartwood

Affected Environment

Forest insects and diseases are normal components of the forested sites in the CPOW Project Area. Some of them exist, and will continue to exist, at endemic levels. Even at low levels of infestation or infection, forest insects and diseases have considerable effects on forest dynamics and resource management values. When they proliferate and become epidemic, the consequences to the forest can be dramatic. Currently there is no indication that insects or diseases are a potential problem in the CPOW Project Area.

Insects

The two most common types of destructive insects found in the CPOW Project Area are defoliators and bark beetles.

Forest Defoliators

Forest defoliators eat the leaves or needles of forest trees. Unlike bark beetles, defoliators usually do not kill trees but slow down tree growth and increase susceptibility to secondary attack by other insects and diseases. All species of trees are not equally susceptible to injury from defoliation. Hardwood species can usually withstand several years of defoliation because they store large food supplies and can refoliate in the same year. Conifers, on the other hand, may be killed by a single defoliation if it occurs prior to bud formation in midsummer.

The two most common forest defoliating insects that occur within the Project Area at endemic levels include the following.

BLACK-HEADED BUDWORM, *Acleris gloverana* (Wals) is one of the most destructive forest insects in coastal Southeast Alaska. In the 1950's, almost one-third of the net timber volume was lost on some hemlock sites due to budworm defoliation. Larvae usually confine their feeding to new growth. In large concentrations, the larger larvae will feed on older needles. Budworm defoliation can result in growth reduction, top-kill, and, at times, tree mortality. Budworm populations are characterized by sporadic spectacular increases followed two to three years later by equally rapid declines.

HEMLOCK SAWFLY, *Neodiprion tsugae* (Middleton) is a serious defoliator of western hemlock throughout Southeast Alaska. Outbreaks tend to be more severe and of longer duration in the area south of Frederick Sound, especially along Clarence Strait. Larvae feed on mature foliage rather than the current year's foliage. Most sawfly outbreaks do not cause tree mortality, but some trees are top-killed and radial growth may be reduced. Tree mortality becomes more likely when sawfly and black-headed budworm populations coincide. This is due to the feeding habits of the two defoliators; the budworm feeds on the current year's foliage, whereas sawflies consume previous years' foliage. Natural controls usually reduce epidemic sawfly populations within a few years. Wetter than normal summers help reduce sawfly populations by favoring conditions for fungal growth. Fungi readily infect and kill sawfly larvae under warm, damp conditions. Low summer temperatures can also delay sawfly development and reduce the opportunities for successful egg laying. Eventually starvation and poor nutrition brought about by depletion of the host foliage will also contribute to the population collapse.

Bark Beetles

Bark beetles are probably the most destructive forest insect in Alaska. Bark beetles prefer to breed in weakened host material. However, during favorable climatic periods for beetle development, populations may build up rapidly and healthy trees are successfully attacked. Bark beetles girdle the phloem which, in turn, disrupts the downward movement of nutrients. Some bark beetles, notably those of the genus *Dendroctonus*, have a symbiotic relationship with blue-stain fungi. The blue-stain fungi can completely penetrate the sapwood within a year. The fungi plug up the outer conducting tissues in the xylem which halts upward water movement. This action, plus that of the bark beetles, causes the death of a host tree.

SPRUCE BEETLE, *Dendroctonus rufipennis* (Kirby) outbreaks have been noted across the Tongass National Forest and adjacent lands in previous years. The spruce beetle life cycle is two years, with adult beetles emerging in late May to early June in search of susceptible host material (spruce logs). Dispersing adults can fly for long distances, over seven miles nonstop. Adult mortality during dispersal is quite high. Female beetles are attracted to windthrow and other downed material. Beetles prefer to attack the sides and bottoms of downed material because of favorable temperature and moisture regimes for brood development. Males are attracted to the site via airborne chemicals produced by the female beetles.

Most outbreaks originate in blowdown or logging residuals (cull logs) and spead to adjacent standing timber. Mortality in unmanaged Sitka spruce stands varies and can be as high as 75 percent.

Diseases

Some of the more common diseases and other forms of damage are discussed below.

HEMLOCK DWARF-MISTLETOE, *Arceuthobium tsugense* (Rosendhal, G.N. Jones) is a destructive disease of western hemlock throughout the Project Area. Infestation levels vary in old-growth hemlock stands. Dwarf-mistletoe is absent in some stands, and in other stands almost every hemlock is infected. The volume of western hemlock trees heavily infected with dwarf-mistletoe can be reduced as much as 50 percent over a 100 year period. Dwarf-mistletoe is species specific and rarely infects Sitka spruce and mountain hemlock.

The spread of dwarf-mistletoe in young hemlock stands is often the result of leaving standing infected hemlock in cutover areas (TLMP Revision Supplement). Dwarf-mistletoe responds to light with increased seed production. Rates of spread to adjacent and lower canopy trees will increase in partial cuts where infected hemlocks remain.

ALASKA YELLOWCEDAR DECLINE, which leads to reduced growth and eventual death of Alaska yellowcedar, is a widespread problem throughout the Project Area. This decline is associated with wet, poorly drained sites, and recent research has demonstrated that the primary cause of decline cannot be attributed to any contagious organism (TLMP Revision Supplement). Since it is not contagious, Alaska yellowcedar decline will not spread to sites where it is not found now (TLMP Revision Supplement Draft EIS, pg. 3-117). Because Alaska yellowcedar has high timber value, this annual mortality represents a significant loss in timber value. In addition, substantial acres of old-growth cedar forests have been harvested and are regenerating to other species. The regeneration of Alaska yellowcedar needs to be specifically considered, where it forms a significant component of a site proposed for harvest.

Other

HEMLOCK FLUTING results in deeply incised grooves and ridges that extend vertically along the trunk of the tree. This condition reduces the value of hemlock logs because they yield less sawlog volume and because some of the milled wood contains bark. The cause of hemlock fluting is not completely known, but is believed to be genetically controlled. Some sites are heavily affected, to the point of making the stand unsaleable, while other sites have relatively light or no damage.

DECAYS that affect the stem and root systems are probably the major cause of volume loss within the Project Area. Many decay fungi enter through tree wounds. The accidental wounding of trees during partial cuts and commercial thinnings will increase the impact from decay organisms in managed stands.

Trees are susceptible to a sequence of diseases at different stages of their growth. Early susceptibility thins a forest stand resulting in more vigorous crop trees. In turn, late susceptibilty removes the older and more decadent trees, making room and preparing the way for new trees.

Effects of the Alternatives

Specific pests will be affected differently by each of the alternatives. In general, increasing timber harvest will decrease the impacts of the spruce beetle and timber volume loss by pests such as wood decay fungi and hemlock dwarf mistletoe. From the perspective of timber management, the health of the forest is increased through timber harvesting. However, many of these pests also contribute significantly to ecosystem diversity and long-term stability in old-growth stands by providing increased canopy diversity and animal habitat, and by causing the formation of small scale gaps.

In general, endemic levels of insect and disease activity in mature and overmature forests will be allowed to run their course. Tree losses will be accepted. Salvage logging that exceeds the intent of "minor changes" as defined under the timber sale contract and or direct control measures will require additional NEPA analysis prior

to implementation. The action alternatives all have the same relative environmental consequences from a pest management standpoint regardless of whether viewed from a timber production or a biodiversity perspective.

The previous statement is true as long as the range of silvicultural systems applied remains constant across all alternatives. Partial cuts that retain overstory trees will result in western hemlock (the most tolerant species) forming a much larger percentage of the future stand composition. Sitka Spruce, western redcedar, and Alaska yellowcedar occurrence in these sites would be greatly reduced. Partial cutting would increase dwarf-mistletoe infection. Unless a large investment were made to sanitize the stand (remove infected trees) periodically, the future value of the site for timber production could be reduced or even eliminated from an economic standpoint.

SOILS

Key Terms

Alluvium - sand, gravel, and fine material made by a stream
Bedload - sand, silt, and gravel, or soil and rock debris rolled along the bottom of a stream by the moving water
Debris avalanche - the sudden movement downslope of the soil mantle; occurs on steep slopes and is caused by the complete saturation of the soil from prolonged heavy rains
Debris torrent - landslides that occur as a result of debris; avalanche materials which either dam a channel temporarily or accumulate behind temporary obstructions such as logs and forest debris
Duff - vegetative material covering the mineral soils in forests, including the fresh litter and decomposed organic material
Fines - minute particles of soil
Karst - a type of topography that develops in areas underlain by soluble rocks, primarily limestone
Mass movement/wasting - general term for a variety of processes by which large masses of earth material are moved by gravity either slowly or quickly from one place to another
Mass Movement Index (MMI) - rating used to group soil map units that have similar properties with respect to the stability of natural slopes
Riparian area - the area including a stream channel, lake or estuary bed, the water itself, and the plants that grow in the water and on the land next to the water
Sediment - solid materials, in suspension or transported by water, gravity, ice, or air
Slip plane - closely spaced surfaces along which differential movement takes place in rock
Soil productivity - capacity of a soil to produce plant growth, due to the soil's inherent chemical, physical, and biological properties
Till - gravel, boulders, sand, and finer materials transported and deposited by a glacier
V-Notch - a shallow to deeply cut stream drainage, generally in steep, mountainous terrain; would look like a "V" from a frontal view
Wetlands - areas that are inundated by surface or ground water with a frequency sufficient, under normal circustances, to support vegetation that requires saturated or seasonally saturated soil conditions for growth and reproduction
Windthrow - areas where trees are uprooted, blown down, or broken off by storm winds

Affected Environment

Introduction

Soils on Prince of Wales Island (POW) are found on a variety of terrains shaped by glaciation and characterized by U-shaped valleys with mountains extending 2,000 to 3,000 feet above sea level. Glacial till of variable thickness occurs in the valley bottoms and up to 1,500 feet on the sideslopes. Many of the valleys have numerous rocky knobs scoured by glaciation.

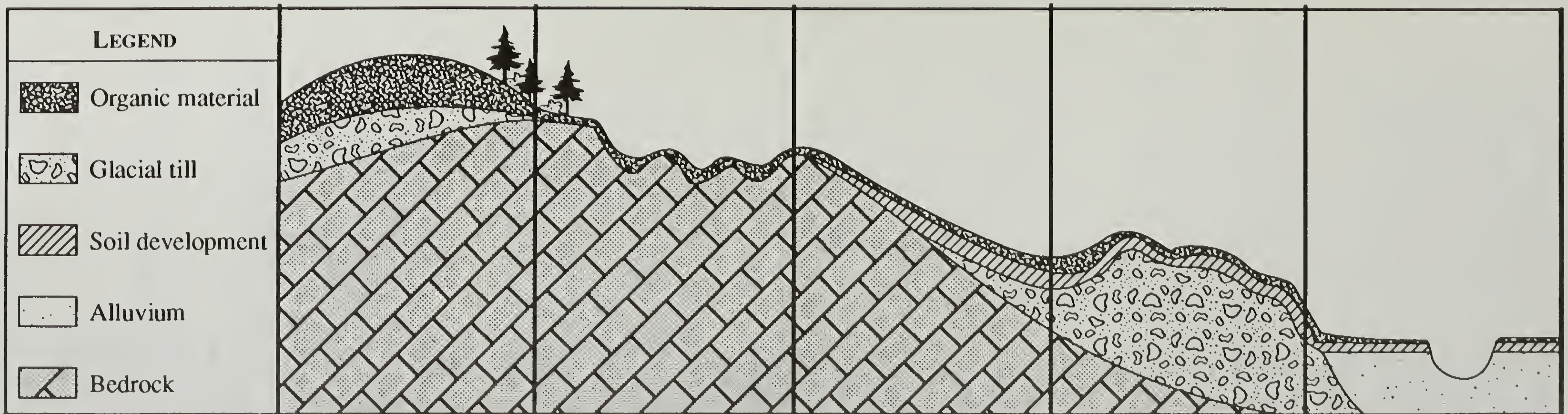
Soil development in Southeast Alaska is influenced by high levels of rainfall, cool maritime temperatures, and moderately low yearly soil temperatures. Under these conditions, organic matter decomposes slowly, resulting in a thick layer of organic duff. This surface organic layer is generally nutrient-rich. The subsurface mineral soil below the organic layer is generally nutrient-poor, because high amounts of rainfall leach nutrients from the soil. High rainfall also can lead to erosion of mineral soils if they are not protected by an organic duff layer. In general, the characteristics of the parent material, topography, vegetation, and climate influence the features of soils that affect and are affected by timber harvest activities. Soils influence the overall vegetation composition, water quality, riparian area and wetland functions and values, and productivity of timber, fish, and wildlife in the CPOW Project Area.

A soil inventory which identifies the soil types, their distribution and extent, has been completed on the CPOW Project Area (Soil Survey for the Ketchikan Area, USDA Forest Service, unpublished.). Soil descriptions and pertinent soil references are available in the Ketchikan Area Supervisor's Office. Soil references include: the current Tongass Land Management Plan (TLMP 1979a, as amended) Chapters 2 and 5; the Forest Ecosystems of Southeast Alaska (Swanston 1974); the Southeast Area Guide (USDA Forest Service 1977); the Alaska Regional Guide (USDA Forest Service 1983); anda soil inventory maps and associated soil series and map unit descriptions.

Soil Groups

Soils within the CPOW Project Area can be grouped by typical properties that influence the use and management of an area. Five soil types are important in the Project Area: (1) mineral soils, composed mainly of sand, silt, clay, gravel and rocks, (2) organic soils, composed of partially decomposed plant tissues; (3) soils formed over compact till; (4) riparian soils, made up of alluvial sand, silt and gravel; and, of special management concern, (5) the McGilvery soil series. This latter soil is composed of a thin layer of organic material overlaying bedrock. Figure 3-9 illustrates relevant characteristics of mineral, organic, till, and riparian soil types.

Figure 3-9
Soil characteristics



	ORGANIC	McGILVERY	MINERAL	TILL	RIPARIAN
DESCRIPTION	Thick layer, partly to decomposed plant materials	Forest litter and partly decomposed plant material over bedrock	Shallow to deep soils developing in residuum or colluvium	Thin surface, soils developing in glacial till	Shallow to deep soils of stratified sand and gravel
TEXTURE	Mucky peat	Peat	Sandy loam to silt loam	Sandy loam to silt loam	Sand and gravel
SOIL DEPTH	7" to > 6'	< 8"	1' to > 6'	< 20" to < 6'	> 6'
DRAINAGE	Poorly and very poorly drained	Well drained	Well to poorly drained	Well to poorly drained	Well to moderately well drained
MAJOR FOREST TYPES	Nonforest and varied forest types	Western hemlock	Western hemlock, mixed conifer	Western hemlock, Western hemlock/ yellowcedar	Sitka spruce
LANDFORM	Ridgetops, benches, depressions, valley floor	Upper backslopes of hills and mountains	Valley floors, hillslopes, mountain sideslopes, ridgeslopes	Moraines, drumlins, and valley floor deposits	Floodplains, stream terraces
MASS MOVEMENT INDEX CLASS	Generally low	Low	Low to very high	Low to very high	Low
TIMBER SITE PRODUCTIVITY CLASS	Low to moderate	Medium to high	Medium to high	Medium to high	High
WETLAND HABITAT POTENTIAL	High	Low	Medium	Medium	Very high
UPLAND HABITAT POTENTIAL	Low	Medium	High	High	Very high
ACRES & PERCENT OF PROJECT AREA	129,345 acres 40 percent	26,852 acres 8 percent	186,198 acres 58 percent	93,154 acres 29 percent	6,045 acres 2 percent

Soil Properties

Long-term Soil Productivity

Soil and its productivity are critical elements, since they also affect the productivity of most other forest resources. Tree growth and wildlife and fish habitat are often associated with soil productivity (the soil component of long-term site productivity), which is the inherent capacity of a soil to support the growth of specific plants or plant communities (FSM 2554.03). In the Project Area, productivity of mineral soils (in terms of tree growth) ranges from very high on floodplains, till plains and most other lowlands, to medium to high on moderately well to well drained soils, to lowest on somewhat to very poorly drained soils. Productivity (in terms of tree growth) on poorly and very poorly drained organic soils, regardless of elevation or northern extent, is generally much lower than the productivity of mineral soils.

Soil productivity can be predicted reasonably well from soil type characteristics. Soil drainage, coarse fragment content, soil organic matter and soil depth are responsible for the greatest difference in forest productivity in Southeast Alaska and relate most directly to timber growth, according to a number of studies (Stevens, Gass and Billings 1968; Ford, Farr and Ping 1988).

Soil organic matter content influences the physical and chemical properties of soils and accounts for at least half of the soil's nutrient pool. It also supplies energy and food for the microorganisms which are responsible for many biochemical changes as decay takes place. Organic matter is the product of three major factors: 1) vegetation cover, 2) climate, and 3) soil organisms.

Vegetation Cover. The original source of the soil organic matter is plant tissue. Under natural conditions, the tops and roots of trees, shrubs, grasses, mosses and other native plants annually supply large quantities of organic residues. Approximately 40 percent of the soils found within the Project Area are composed almost entirely of organic matter.

Climate. Climatic conditions, especially temperature and rainfall, exert a dominant influence on the amount of organic matter found in soils. In general, decomposition of organic matter is slowed in cooler climates; organic matter also increases as the effective moisture becomes greater (Brady 1974). Thus the low mean annual temperatures of Southeast Alaska combined with high amounts of rainfall yield an overall high amount of organic matter.

Soil Organisms. Decomposition of both plant residues and soil organic matter is a process of decay, as the plant residues are digested by microorganisms. The specific flora and fauna inhabiting soils depend on many factors, including climate, vegetation, soil temperature, acidity, and soil moisture (Brady 1974). In general, the forests of Southeast Alaska and the Project Area have a high diversity of soil fauna, but these organisms are not very active due to low temperatures. Thus, again, we have slow decomposition and high accumulation of organic matter.

Because of the importance of organic matter on forest productivity, maintaining the surface litter and organically enriched topsoil layers is critical for maintaining long-term site productivity. Soil productivity and its related nutrient content can be influenced in a number of ways by timber management activities. Removal of the surface layer may be caused by landslides, surface erosion, severe yarding disturbance, or from displacement by roads, skid trails, landings or rock pits. Soils can also be damaged by puddling, which impairs soil porosity and drainage, and therefore reduces productivity. Changes in soil productivity that last beyond the planning period

are considered to be significant impairments. Fifteen percent reduction in inherent soil productivity potential will be used as a basis for setting values for change in measurable or observable soil properties associated with long-term productivity (FSM 2554.03).

Soil Erosion

Two major types of erosion occur within the Project Area: (1) surface erosion, and (2) landslides.

Surface Erosion. Most undisturbed soils in the CPOW Project Area are resistant to surface erosion because they are generally protected by the surface layers of duff and the roots of vegetation. However, when mineral soils are exposed, gravity and running water can cause natural erosion. The rate of erosion depends primarily on the amount of vegetation ground cover and the steepness of slope. Locations where surface erosion and mass wasting are most likely are along stream banks, snowslide or avalanche slopes, and within V-notches. Timber harvest activities and road construction may increase the erosion rate by exposing mineral soil.

Landslides. Landslides are the dominant process of natural erosion in Southeast Alaska. Many landslides occur during or immediately after periods of heavy rainfall when soils are saturated. Landslides usually occur on steep slopes that have soils with distinct subsurface "slip" layers (slip-planes), such as compacted glacial till or bedrock that slopes parallel to the ground surface. These areas have a high likelihood of landslides, especially if disturbed by blasting rock or road pioneering, side casting of excavated material, or logging practices that cause substantial surface disturbance.

Vegetation, particularly tree roots, seems to have a stabilizing effect on slopes, but tree roots tend to significantly decrease in strength five to seven years after a tree is cut (Swantson 1989). This decrease in soil holding capacityresults in an increased likelihood of soil movement on steep slopes following clearcutting. Effects of partial cutting on slope stability in Southeast Alaska are relatively unknown. Further, the displaced roots of uprooted trees can disturb the subsurface soil whenever trees are blown down by heavy winds or when stumps are loosened or removed during tree harvest. Under natural conditions, windthrow is an important triggering device of debris avalanches and flows in Southeast Alaska. Recent research in Southeast Alaska (Swanston 1989) has suggested that although less than 10 percent of all landslides in the past 20 years were related to logging or roads, logging and roads may increase the potential for landslides in a given area.

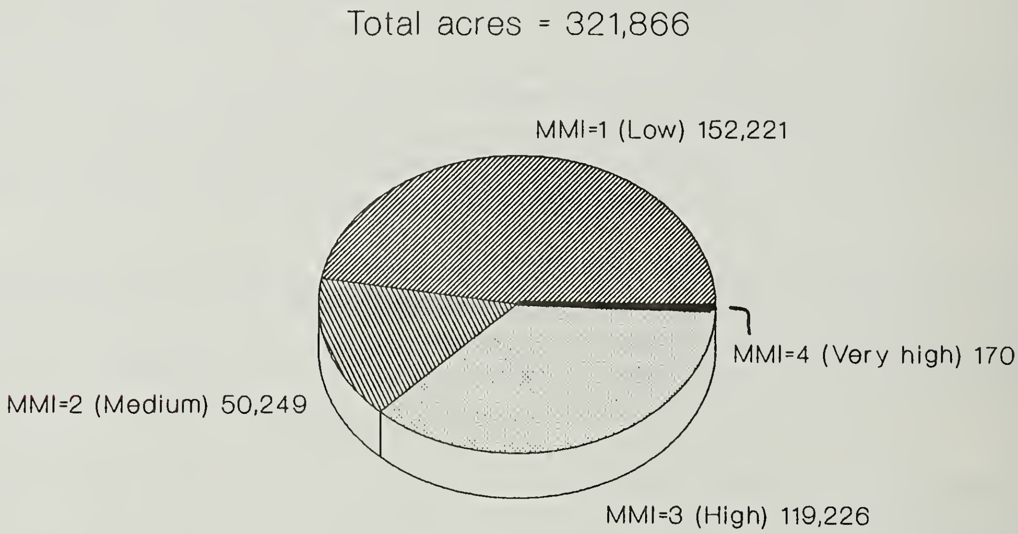
A broad analysis of soil stability conducted in the past five years on the Project Area was based on the Ketchikan Area Soil Survey. Landslide mass movement index (MMI) ratings were used to group soil map units that have similar properties with respect to the stability of natural slopes. Four classes of mass movement index—1(low), 2 (medium), 3 (high), and 4 (very high)—have been assigned to soil map units according to their relative potential for landslides, as indicated by their physical properties.

Naturally unstable soils are common throughout the CPOW Project Area. Areas where concentrations of high MMI soils occur are located in VCU's 571, 580, 588, and 590. Very high MMI soils include shallow, fine-textured soils on slopes greater than 75 percent, and on slopes with restricted drainage occurring on slopes steeper than 65 percent. Figure 3-10 shows total acres of each mass movement index class in the Project Area. These figures represent MMI classes as identified from the Soil Resource Inventory maps in the GIS. MMI ratings in the GIS are based on general

characteristics of typical soil map units. Actual MMI class may be higher or lower depending on field investigation.

Maps in the Planning Record display the distribution of high and very high MMI soils within the Project Area in relation to roads and harvest units for each alternative. These areas are also displayed for each unit in Appendix D (Vol. II, Unit Cards). Very high MMI soils are not suitable for timber harvest, as described in the TLMP Draft Revision (1991a), Timber Suitability Classification, pp. A1-16.

Figure 3-10
Inventoried Mass Movement Index Classes in the Project Area



Floodplains, Riparian Areas, and Wetlands

Floodplains and Riparian Areas

Floodplains are composed of naturally-eroded sediments carried by the stream or river and deposited in slack water sections of channels during high water periods. Floodplains are considered to be areas subject to a one percent (100 year-recurrence) or greater chance of flooding in any given year. Nutrient-rich sediments underlain by coarse-textured sediments make floodplains the most productive lowland timber, wildlife, and fisheries resource sites on the Tongass.

Riparian areas include stream or lake systems and the adjacent land. Approximately 6,045 acres of riparian area based on soil characteristics are mapped within the Project Area. Riparian area soils are identified in greater detail on the map describing soil groups, found in the Planning Record. A riparian ecosystem is identified in part by soil characteristics or distinctive plant communities that require free or unbound water (FSM 2526.05).

The definition of riparian areas based on soil types (6,045 acres) used in this section is different from the broader definition of riparian habitat used in the Wildlife section of this chapter (18,422 acres). One reason for the difference is the relatively large scale used to classify soil types, which cannot account for numerous small areas. Another reason is that the evaluation of riparian habitat for wildlife purposes included protective buffers designated by TTRA and Forest Service standards and guidelines as well as soil types. For an illustration of riparian habitat characteristics, see Figure 3-21 in the Wildlife section of this chapter.

Approximately 39 percent (2,327 acres) of all existing riparian areas within the Project Area were harvested between 1954 and 1990. Most of the harvest occurred in the Staney Creek watershed (VCU 588), with approximately 535 acres of riparian area cut. This equates to 88.5 percent of the riparian area in this VCU, or approximately 3 percent of the entire VCU. Other areas where extensive amounts of riparian areas have been harvested include: VCU's 581, 580, and 590, with 337, 317, and 227 acres of harvest respectively.

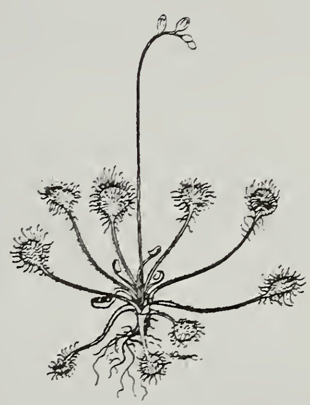
Riparian areas previously harvested for timber are now in various stages of secondary plant succession. Except where the ground is highly disturbed, the stand composition on the secondary successional riparian areas is similar to the riparian vegetation prior to timber harvest, with spruce, hemlock and cedar forming the tree canopy. On the more disturbed sites, the vegetation is often composed of early successional species, such as alder and salmonberry.

Wetlands

Wetlands are defined as: "those areas that are inundated or saturated by surface or groundwater with a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions" (40 CFR 230.41(a)(1)). Approximately 53 percent of the Project Area is classified as wetland. These include muskegs, estuaries, freshwater sedge meadows, forested wetlands (commercial and non-commercial), and freshwater streams. Descriptions of characteristics for these wetland types can be found in the TLMP Draft Revision (1991a). Estuaries are discussed in more detail in the Fisheries section of this chapter. The total area of each wetland type within the Project Area is shown in Table 3-7. A wetlands map of the Project Area can be found in the Planning Record.

Table 3-7
Wetland Type on Project Area

Wetland Type	Acres
Open Muskeg	65,031
Forested Scrub/Shrub	97,705
Estuary	48
Lakes and Ponds	7,178
TOTAL WETLANDS	169,962



Value and Function. The natural and beneficial values and functions of each wetland type differ in terms of their benefit to wildlife habitat, fish habitat, hydrologic properties (flood flow moderation, groundwater recharge and discharge), site productivity, and water quality protection.
Wetlands are associated with significant values and functions. *Values* are defined here as socio-economic in nature, including: aesthetics, commercial fishing (critical salmon habitat provided by estuaries, streams, and lakes), development sites (for example, buildings and roads), community water supplies, actual and potential recreation, and timber harvesting. *Functions* are ecosystem attributes and can be organized as follows:

- *Physical functions*: flood conveyance, coastal erosion barriers, water retention and regulation, heat absorption, and sediment collection.
- *Chemical functions*: acidic water pH levels, high tannins, and ability to accumulate significant carbon and nutrients (nitrogen).
- *Biological functions*: wetlands in Southeast Alaska produce timber (generally in lower volume classes), provide critical habitat for fish (notably salmon) and wildlife (notably waterfowl and bears), and provide smaller animals as part of the food web. Wetlands feature high plant and animal diversity.

While wetlands values and functions are clearly of a great management importance, their quantification remains incomplete. Area soil scientists, ecologists, hydrologists, and other specialists are working to further define functions and values in Southeast Alaska ecosystems.

Effects of the Alternatives

Soils: Direct and Indirect Effects

Soil Productivity

The action alternatives have the potential to reduce soil productivity. However, application of soil management practices for the maintenance or improvement of soil productivity (FSH 2509.18) will limit these reductions below threshold levels (FSM 2554 R10 Supp. 2500-92-1). Furthermore, units were located and designed during the planning process to minimize adverse effects on soil productivity.

Areas of soil presently supporting productive ecosystems would be disturbed in all the proposed action alternatives to varying degrees. Disturbance of sites by road, landing and rock pit construction will result in the loss of soil. Timber harvest may result in soil disturbance, displacement, puddling, or compaction that could reduce soil productivity. Road construction and timber harvest may result in an increase in the occurrence of landslides (Loggy 1974; Swanston 1989) and may result in reduced productivity on those sites.

Table 3-8 displays the acres of low, medium, and high soil disturbance that may occur with each alternative.

Table 3-8
Acres of Low, Medium and High Potential Soil Disturbance

Soil Disturbance	Alt. 1	Alt.1a	Alt. 2	Alt. 3	Alt. 4	Alt. 5
Low	0	0	167	159	224	152
Medium	0	0	474	320	0	300
High	0	0	611	632	760	604
Total	0	0	1,252	1,110	984	1,056

Soil disturbances resulting from landslides and other surface disturbances often result in long-term reduction of soil productivity. The amount of time required for

rehabilitation depends on the severity of the disturbance and its exposure to continued aggravating forces.

Soil Erosion

Some soil erosion and landslides will occur in all alternatives, including the no-action alternative. Erosion will most likely occur on areas where the soil surface has been heavily disturbed or removed. The amount of erosion that occurs will then be related to the amount of soil disturbance that takes place (see Table 3-8.)

Two forms of erosion may be accelerated by timber harvest activity:

- **Surface Erosion** includes sheet, rill, and gully erosion on exposed mineral soils caused by felling and yarding activities, road surfaces, cutbanks, and borrow pits.
- **Landslides**, which may be triggered by: (1) windthrow along cutting unit boundaries; (2) soil disturbance through felling and yarding activities; and (3) road-building activities such as blasting, excavating slope support, overloading slopes by sidecasting excavated soil materials, and directing and accumulating water.

Surface Erosion. Professional judgement of soil scientists who have extensive experience in field operations in the Ketchikan Area of Southeast Alaska suggests that most cable yarding operations result in 5–20 percent mineral soil disturbance. However, it is possible to reduce the surface disturbance to less than 5 percent, thereby minimizing human-induced erosion, by using logging systems capable of achieving partial and/or full suspension of logs during yarding.

The total acres of timber harvested provide a way to compare the amount of soil subject to potential disturbance from harvest activities, which results in increased surface erosion and productivity loss. Of the action alternatives, Alternative 4 includes the fewest acres of harvest and Alternative 3 includes the greatest amount of harvest. Alternatives 2 and 5 rank second and third in terms of the amount of acres harvested, in decreasing order.

Landslides. Landslides are most likely to occur when roads are constructed on landscapes with very high mass movement indices (MMI). Landslides typically occur less frequently when roads are constructed or timber is harvested on areas with high MMI. In most cases landslides are not as common on areas with medium or low MMI.

A minor degree of soil disturbance is unavoidable under any reasonably practicable timber harvest activity. For the Project Area, only 170 acres of the land base occur on soils inventoried as having a very high MMI. These soils are classified as unsuitable for the production of commercial timber. Thirty-seven percent of the forest land base occurs on soils inventoried as having a high MMI. Units with high MMI ratings will receive special consideration by a soil scientist to mitigate concerns associated with timber harvest. Road construction may require geotechnical evaluation. (See Mitigation Measures, Chapter 2).

Table 3-9 presents data on soil disturbance by alternative. Of the action alternatives, Alternative 4 is expected to create the least amount of soil disturbance (3,073 acres) on high MMI soils, while Alternative 3 is expected to create the greatest amount of disturbance (4,089 acres).

Table 3-9
Acres of Timber Harvest on Mass Movement Index Soils

	Alt.1	Alt.1a	Alt.2	Alt.3	Alt.4	Alt.5
Very High MMI(4)	0	0	0	0	0	0
High MMI(3)	0	0	3,672	4,089	3,073	3,548
Medium MMI(2)	0	0	1,895	1,670	1,922	1,899
Low MMI(1)*	0	0	4,751	4,941	4,562	4,681

* Includes as yet unclassified soils, which were evaluated and determined to be low.

Road building activities are sources of landslides and sediment. Preliminary monitoring reports of landslides initiated by road construction within the 89-94 KPC Long-term Sale Project Area show that 13 landslides occurred within a two-year period (Landwehr 1992). The total area disturbed from all 13 landslides was less than three acres. A plan that minimizes road building over potential landslide areas would lessen the possibility of landslide occurrence and associated impacts. Table 3-10 presents acres of road clearing resulting from construction on MMI soils for each alternative (clearing limits were assumed to be 75 feet). Of the action alternatives, Alternative 5 proposes building the least amount of road over high MMI soils, and Alternative 4 proposes to build the most over these soil types. It is assumed that specified roads are located outside of units, and that temporary roads are already included within harvested areas.

Table 3-10
Acres of Road Construction by MMI Class*

	Alt.1	Alt.1a	Alt.2	Alt.3	Alt.4	Alt.5
Very High MMI(4)	0	0	0	0	0	0
High MMI(3)	0	0	328	409	424	304
Medium MMI(2)	0	0	144	133	188	132
Low MMI(1)**	0	0	364	467	379	291

*Includes rock pits.
**Includes as yet unclassified soils, which were evaluated and determined to be low.

Table 3-11 presents data on total acres of potential disturbance on high MMI soils by Alternative. In order of increasing impacts, Alternatives 1 and 1a are lowest, followed by Alternatives 4, 5, 2, and 3.

Table 3-11
Acres of Roads and Harvest on Mass Movement Index Soils

	Alt.1	Alt.1a	Alt.2	Alt.3	Alt.4	Alt.5
Very High MMI (4)	0	0	0	0	0	0
High MMI (3)	0	0	3,999	4,498	3,500	3,857
Medium MMI (2)	0	0	2,040	1,806	2,113	2,026
Low MMI (1)*	0	0	5,115	5,405	4,935	4,972

* Includes as yet unclassified soils, which were evaluated and determined to be low.

There is a low potential for significant impacts to water quality and fish habitat from management-induced landslides if any of the action alternatives is implemented. The results of a recently completed Tongass-wide landslide survey can help illustrate the potential for landslide impacts in the CPOW Project Area (Swanston and Marion 1991). This regional landslides survey, which included only large landslides greater than 100 cubic yards of soil displacement, estimates a natural landslide rate of .93 over 20 years for an area the size of the Project Area. Following timber harvesting, this landslide rate would be expected to increase to 3.3 slides over a 20-year period. However, these results also indicate that a relatively small percentage of sediment generated from large wasting events will reach a stream. Swanston (1989) estimated that the increase in the incidence of landslides over natural occurrences throughout Southeast Alaska was about 3.5 times greater on managed acres.

Swanston's Tongass landslide survey categorized 23 percent of all landslides as debris torrents that occur in deeply cut V-notch gullies. Long-term impacts (greater than 10 years) to channel form and function and to fish habitat would be anticipated for Class I channel segments directly affected by a large landslide (Hogan and Wilford 1989). Based on Swanston's results, there is about a one-in-four chance that any management-related landslide will have a major impact on Class I streams and only a very slight chance that major impacts on fish habitat could occur. It can be inferred that the majority of these debris torrents would affect primarily Class III stream channels, since only about three percent of all natural and management-induced slide events in this survey were shown to directly affect Class I streams.

Care should be taken in extrapolating these results to the Project Area. Road construction and harvesting technology changes, as well as greater sensitivity to water quality and fish habitat concerns (as reflected in BMP's, for example), have resulted in improved management practices for timber operations in landslide prone areas. These factors will tend to reduce management-related landslide incidences in the Project Area from the rate observed by Swanston. On the other hand, many of the areas included in Swanston's survey had road systems that were predominantly located on stable locations on lower valley slopes. Roaded segments in the Project Area are proposed on relatively steep slopes, a factor which would tend to increase the potential incidence of road-related landslides. Thus, the frequency of landslide occurrence in the area is difficult to predict; however, areas with a high potential for landslide

occurrence were evaluated in the planning process, and timber harvest was deferred in many of these areas during unit design (see Appendix C).

Soils: Cumulative Effects

Effects of the proposed action alternatives upon long-term soil productivity are directly related to the amount of soil disturbance that occurs through time and the amount of recovery that takes place in the soil system during this time. The soil is a complex system with the capacity to absorb and recover from many of the impacts resulting from a project of this nature.

Table 3-12 shows the potential cumulative acres of timber harvest and road construction projected through the life of the Long-Term Contract. Alternative 3 would have the greatest effect in 1996. Alternatives 2, 4, and 5 show a balance of soil disturbance by current activities (1993) and future activities. In all instances, the actions proposed would minimize soil disturbance to the maximum extent practicable through implementing the BMP's in the Soil and Water Conservation Handbook (FSH 2509.22).

The reasonably foreseeable future (2004) timber harvest is expected to be approximately 270 MMBF (see Appendix A). For this analysis it is assumed to equal 10,000 acres of timber harvest and approximately 100 miles of road construction (which translates to about 909 acres), for a total of 10,909 acres of potential soil disturbance.

Table 3-12
Cumulative Acres of Timber Harvest and Road Construction

Alternative	1993*	1996**	2004***
1	87,014	87,014	97,923
1a	85,995	85,995	96,904
2	87,014	98,168	109,077
3	87,014	98,723	109,632
4	87,014	97,562	108,471
5	87,014	97,869	108,778

*Already cut; includes timber harvest and road construction.
**1993 + proposed (Table 3-9) ***1996 + 10,909 acres

Floodplains, Wetlands, and Riparian Areas: Direct and Indirect

Floodplains

Executive Order 11988 directs Federal agencies to provide leadership and take action on Federal lands to avoid to the extent possible the long- and short-term adverse impacts associated with the occupancy and modification of floodplains. Agencies are required to: 1) avoid the direct or indirect support of floodplain development whenever there are practicable alternatives; 2) evaluate the potential effects of and proposed action on floodplains; 3) ensure that planning programs and budget requests consider flood hazards and floodplain management; and 4) prescribe procedures to implement the policies and requirements of the Order.

Impacts upon floodplains for the alternatives are generally limited to effects of road construction. The small area (74 acres) of floodplains proposed for actual timber harvest would not affect flooding or erosion.

During road construction, both direct and indirect impacts to floodplains may occur. There may be no detectable influence, or there can be flow alteration in minor streams because of routing by roadside ditches and culverts. Channel and flow alteration may locally affect the velocity of flows, width, and depth of water, and the location of flow. Such factors may physically result in different erosion and sediment transport characteristics.

TLMP Draft Revision (1991a) standards and guidelines will be used to minimize impacts on floodplains as well as to protect roads and drainage structures. Examples of such practices include designing bridges and culverts to handle the expected flows, and installing frequent cross drains or ditch relief culverts to minimize erosion from large concentrations of water moving overland or where they center natural drainages.

Wetlands

Executive Order 11990, as amended, requires Federal agencies exercising statutory authority and leadership over Federal lands to avoid to the extent possible the long- and short-term adverse impacts associated with the destruction or modification of wetlands. Federal agencies are required to preserve and enhance the natural and beneficial values of wetlands in carrying out their responsibility for: 1) acquiring, managing, and disposing of lands and facilities; 2) providing federally undertaken, financed, or assisted construction and improvements; and 3) conducting Federal activities and programs affecting land use.

BMP's also will be used to minimize impacts to wetlands. Examples of such practices include designing harvest systems capable of removing timber by full suspension or some other low impact yarding system where forested wetlands are planned for harvest. Details of BMP's relevant to the alternatives are discussed in Chapter 2.

Data for proposed roads and units on wetlands were derived using the Ketchikan Area GIS data base. Wetland types and/or habitats were generated using soil inventory maps in the GIS, based on correlations between soil series and plant associations (DeMeo and Loggy, Forest Service Report, unpublished).

Approximately 50 percent (169,962 acres) of the Project Area classifies as wetland; 30 percent (97,705) is forested wetland. Many of the forested wetlands on the Project Area do not support commercial or economic stands of timber and are not scheduled for harvest in this or future plans. Larger muskegs supporting no commercial timber, will not be harvested, but may be affected by yarding operations within the unit. Table 3-13 presents data on proposed harvest on wetlands by alternative. Of the action alternatives, Alternative 5 harvests the least amount of forested wetlands, while Alternative 3 harvest the most acres. Alternatives 2 and 4 rank second and third in terms of most acres of forested wetlands proposed for harvest.

Harvesting wetlands involves manipulation of the vegetation, which temporarily changes the hydrology of the site. Patric (1966) suggests an increase in water yield may result from timber harvest. A temporary increase in soil moisture is expected until vegetation is reestablished.

Timber site productivity on wetland soils is typically lower than on better drained soils. Growth rates on wetland sites are expected to be slower than non-wetland sites, and merchantable timber may not be available in a 100-year rotation. Areas where slow growth is expected ranges from 35 to 47 percent of the total harvest, depending on alternative (Table 3-13).

Table 3-13
Acres of Proposed Harvest Activity on Wetlands by Alternative

	Alt.1	Alt.1a	Alt.2	Alt.3	Alt.4	Alt.5
Total Harvest	0	0	10,318	10,700	9,557	10,128
Wetland Harvest	0	0	3,643	4,581	4,463	3,568
Percent of Total	0	0	35	43	47	35

New road construction on wetlands will be limited to the needed transportation components of roads, landings, and drainage structures. Best Management Practices (BMP's) will be used, especially with regard to the use of wetlands as filter strips to capture sediment. Ditch construction will be minimized on open muskegs (peatlands) to the extent consistent with minimizing water accumulations on the road surface and sediment production.

Rock overlay construction on wetlands covers the vegetation but provides a highly permeable fill that minimizes changes in hydrologic conditions. No changes in chemical conditions are anticipated.

Table 3-14 presents data on proposed wetland alterations caused by road construction for each alternative. Action Alternative 5 affects the fewest wetland acres with road construction, and Alternative 3 affects the most acres.

Table 3-14
Acres of Wetlands With Proposed Road Construction

Wetland Category	Alt.1	Alt.1a	Alt.2	Alt.3	Alt.4	Alt.5
Forested Wetlands	0	0	186	278	337	176
Muskeg (peatlands)	0	0	109	154	126	80
Estuary	0	0	0	0	0	0
Total	0	0	295	432	463	256

Roads through wetlands can affect the flow of water in the wetland. Placement of culverts and other road drainage features will ensure that flow and reach of water in the wetland are maintained at a natural level. Impacts from roads will be limited to the wetland directly underlying the road prism and associated cuts and fills.

Application of BMP's during construction will assure that water flows, circulation patterns, and chemical and biological characteristics of the water within wetlands will not be impaired. Additionally, use of BMP's will assure that adverse impacts

to the aquatic environment will be minimized. In terms of terrestrial environment, wildlife use of wetlands for travel ways and predation may be reduced during periods of vehicular traffic on the roads.

Floodplains, Riparian Areas, and Wetlands: Cumulative Effects

Riparian Areas

Table 3-15 summarizes the number of road crossings that will affect riparian areas within the three Aquatic Habitat Management Unit (AHMU) stream classes (Class I, II). All existing road reconstruction and all proposed new road construction are included.

Table 3-15
Number of New Road Crossings on Class I and II Streams in Riparian Areas

Streams	Alt.1	Alt.1a	Alt.2	Alt.3	Alt.4	Alt.5
Cl.I	0	0	5	4	5	4
Cl.II	0	0	3	6	3	2

Table 3-16 lists the percentage of riparian areas (outside TTRA buffers) which will be harvested, by alternative. These areas are predominantly small inclusions within the harvest unit. BMP's will be applied to all riparian areas in harvest units.

Table 3-16
Riparian Areas* Within Harvest Units, by Alternative

	Alt.1	Alt.1a	Alt.2	Alt.3	Alt.4	Alt.5
% of Harvest in Riparian Area	0	0	0.9	0.7	1.2	0.7

*outside TTRA buffers

Wetlands

One area of concern involves effects of logging and road construction on altering the water release and retention function of wetlands, particularly peatlands. These activities may also affect sediment transport across the landscape. By harvesting trees, water tables can be altered and adequate tree regeneration becomes a concern.

The cumulative effects of road building and logging of forested wetlands within watersheds over time are another concern. The assumptions described below will be used to assess these effects.

Assumptions.

- The operable timber base will remain the same. All analysis will be based on the operable timber within the VCU.

- Standards and guidelines for harvest and road construction activities will remain constant over the remaining contact period.
- Future accessibility of timber in relation to wetlands will be similar to the accessibility encountered in this sale.
- Borrow pits are not located on wetland sites.
- Distribution of wetlands is similar in all VCU's. This is not accurate for all VCU's; however, it is a necessary assumption for statistical purposes.

Cumulative Effects of Timber Harvest on Wetlands. Prior to 1993, approximately 81,709 acres of timber were harvested in the Project Area. Approximately 25,726 of those acres, 31 percent, are wetlands. During this operating period, between 3,568 and 4,581 acres of wetlands are scheduled for harvest, depending on alternative (Table 3-13, earlier in this section).

The reasonably foreseeable future (2004) harvest is expected to be approximately 270 MMBF (see Appendix A), and harvest approximately 10,000 acres. To obtain an estimated acreage of wetlands harvested, it is assumed that 31 percent of the 10,000 acres will be wetlands, or approximately 3,100 acres. Cumulative acres of timber harvest on wetlands in the CPOW Project Area are shown in Table 3-17.

Table 3-17
Cumulative Acres of Timber Harvest on Wetlands

Alternative	Total Wetlands (Acres)	Wetlands Harvested Acres 1993	1996	2004
1	169,962	25,726	25,726	28,826
1a	169,962	25,410	25,410	28,510
2	169,962	25,726	29,369	32,469
3	169,962	25,726	30,307	33,407
4	169,962	25,726	30,189	33,289
5	169,962	25,726	29,294	32,394

Cumulative Effects of Roads on Wetlands. Prior to 1993, approximately 2,264 acres of wetlands within the Project Area have had roads constructed over them. This equates to approximately 1.4 percent of all wetlands within the Project Area. The action alternatives propose up to 463 acres of additional road construction on wetland areas (Table 3-14). The rock overlay construction techniques commonly used in Southeast Alaska maintain the hydrologic, chemical, and nutrient regimes of the wetlands. Some localized vegetation changes from open muskeg to forested wetlands have been observed around roads that have been drained with ditches. Of note is the tendency for roads in wetland areas to grow closed with alder unless vegetative growth is prevented by road maintenance.

It is estimated that an additional 100 miles of new road construction will be necessary to access future timber entry through the reasonably foreseeable future (termination of the Long-Term Contract in 2004). Assuming the same clearing limits (75 percent) and assuming that 40 percent of the roads will be built on wetlands, an additional 364 acres of wetlands will have roads constructed over them.

WATER RESOURCES

Key Terms

Anadromous - fish that spend part of their time in freshwater and part of their lives in saltwater
Biotic - living
Mitigation - measures designed to counteract environmental impacts or to make impacts less severe
Sediment - water-transported earth materials
Solute - substance dissolved in a solution
Turbidity - an indicator of the amount of sediment suspended in water

Affected Environment

The water resources of the Project Area can be broken into three areas of consideration. These include: (1) streamflow regime; (2) water quality, including sediment, water temperature, and water chemistry; and (3) consumptive water use. All of these are influenced by climate, which is discussed in the Introduction to Chapter 3. Additional information about watersheds and fish habitats are discussed in the Fisheries section of this chapter.

Streamflow Regimes

River and stream systems are located throughout the Project Area. These usually drain east or west to tidewaters. All streams and rivers produce a large volume of water per unit of land. Runoff varies greatly, depending on the time of year. Spring snowmelt is the likely cause of increased runoff between April and June. In some streams spring runoff can often approach fall runoff, which generally is the period of highest stream flows. Two relatively low flow periods are characteristic of these systems: the first occurs between January and March due to snow and ice accumulation, and the second during mid-July to August due to low precipitation.

Water Quality

Changes in any of the physical and chemical properties of water can directly affect water use by people and other living organisms. The most important characteristics for water management on the Project Area are sediment and chemical properties, especially dissolved oxygen and introduction of foreign chemicals. These water quality characteristics are discussed below and correspond to the key water quality parameters identified in the State of Alaska water quality criteria for maintaining natural productivity of stream, lake, and estuary organisms.

Sediment

Solid materials in suspension or transported by water, gravity, ice, or air are called sediments. Sediments in streams may be transported as either suspended or bedload sediment. Suspended sediment is carried within the water column, while bedload material moves (rolls or bounces) along the bottom of the stream or riverbed. Suspended sediment causes water to appear murky or turbid. Under natural conditions both suspended and bedload sediments move during storm runoff events. The rate of sediment transport depends on discharge velocity and availability of materials.

Stream sediment originates from both geologic processes and human activities. The main natural processes creating sediment are landslides and actively developing stream systems. A regional study (Swanston 1989) indicates that about three percent of all major landslides directly affect fish-bearing streams. Steep terrain and large amounts of rainfall make the land sensitive to natural sediment production.

Concentrations of suspended sediments in the area normally are less than 10 parts per million (ppm) in winter, 4–30 ppm in summer, and occasionally over 100 ppm in the fall during storm runoff. These low levels are attributed to the dense vegetative ground cover.

The major sources of management induced sediment in the area result from: (1) road construction activities, (2) road use and maintenance, and (3) logging activities.

Sediment produced by installation of culverts and bridges is temporary. The amount of sediment produced depends on such factors as the soil grain size, parent material, velocity and volume of water, and the duration of the mechanical disturbance. In studies on stream sedimentation, data gathered before, during and after the construction of a small bridge showed significant increases in sediment produced during removal of small sapling and root wads; after three and one-half minutes, the amount of sediment decreased (89-94 LTS EIS).

Road construction concentrates disturbance along a corridor which produces sediment over a longer period. The majority of sediment production occurs two to five years following initial road construction (Huecker, cited in USDA Forest Service 1992b). Short-term (one to two days) water quality degradation near construction is likely.

Timber harvest operations other than road construction tend to disperse soil disturbance over large areas. Suspended sediment levels from logging activities are low even in heavily logged watersheds. In two watersheds near Hollis, Prince of Wales Island, where clearcuts exceeded 2,000 acres in size, suspended sediments in the Harris River during and following logging never exceeded 3.7 ppm under average flow conditions or 148 ppm during peak flows. In the Maybeso watershed, suspended sediments never exceeded 7 ppm during average flow or 38 ppm during peak flows (LTS EIS).

Alaska Water Quality Standards require that turbidity (an indicator of suspended sediment) not exceed 25 NTU (Nephelometric Turbidity Units) over natural conditions for propagation of fish, and that fine sediment (0.1 mm to 4.0 mm) concentrations not increase by more than 5 percent or exceed a total of 30 percent by weight in stream gravels (ADEC 1989). Data taken from some streams on Prince of Wales Island indicate a mean turbidity value of 1.3 NTU under natural conditions (LTS EIS).

Water Chemistry

Dissolved oxygen is typically at or near saturation in fast-running streams because the churning action tends to bring oxygen into the water. In many lakes and in streams which have smooth, low flows, oxygen concentrations may drop below saturation. Such decreases in dissolved oxygen saturation usually occur in summer dry periods with higher water temperature, when natural biotic demand for dissolved oxygen is at its peak. State of Alaska Water Quality Standards for dissolved oxygen content call for not less than 7 mg/l or 45 percent of saturation for fish, and in no case greater than 17 mg/l or 110 percent of saturation.

The measure of pH indicates the degree of weak acids and bases in the natural waters. This is important for aquatic ecosystems because it affects the solubility of many toxic compounds, particularly heavy metals such as copper. pH is measured in units ranging from 0 to 14. The lower the pH number the higher the acid level; a pH of 7.0 is considered neutral. Water quality data collected in the Project Area indicate a pH range between 6.6 and 7.6 (L.Bartos, USDA Forest Service, Ketchikan Area, unpublished data). These measurements are within the standard established for growth and propagation of fish by the State of Alaska (pH 6.5 to 8.5 and not varying more than 0.5 units from natural) (ADEC 1989). Muskeg streams naturally have pH values lower than state standards of 6.5.

Water is a solvent and a mechanical erosive agent. It contains many dissolved minerals as well as undissolved sediments in suspension. Although water in Southeast Alaska is never completely free of organic and inorganic matter, chemical water quality is high. Concentrations of total dissolved solids are typically less than 150 ppm.

In the past, introduction of foreign chemicals—such as fertilizers, herbicides, and accidents involving commercial transportation of toxic substances and petroleum products—into surface waters of the area has been very low. Fertilizers are generally used only when grass seed is planted on road cuts and some landslides to mitigate surface erosion. Herbicides are generally not used on the Tongass. The main potential for contamination of foreign chemicals in surface waters in the Project Area is the use of petroleum products from logging operations.

A recently signed (March 26, 1992) Memorandum of Agreement (MOA) between the Forest Service and the State of Alaska Department of Environmental Conservation (ADEC) has committed these two agencies to National Forest water quality protection tasks described in the Alaska Nonpoint Source Pollution Control Strategy, approved by the U.S. EPA in August 1990. The MOA was created to ensure that Forest Service activities meet Federal consistency requirements of specified sections of the Clean Water Act and Executive Order 12088. The MOA also establishes the Forest Service as the agency responsible for monitoring and protecting water quality of National Forest lands in Alaska for the purposes of the Clean Water Act, as amended (USDA Forest Service and ADEC 1992).

Consumptive Water Use

Key consumptive water uses within the Project Area include domestic water supply, recreation (cabin water supply use), and some commercial uses. There are no congressionally designated municipal watersheds within the Project Area. However, domestic water supplies for the communities of Thorne Bay, Coffman Cove, and Whale Pass occur within the CPOW Project Area. Coffman Cove uses water for commercial propagation of oysters. A list and map of consumptive water uses and locations within the Project Area are available in the CPOW planning record.

Effects of the Alternatives

Direct and Indirect Effects

The effects of the many land management activities on resident and anadromous fish, on human water supplies, and on other beneficial water uses are complex and not easily quantified. The following sections discuss the effects on water quality, and the risks and magnitude of these effects. Such effects can occur on the hillslopes within the portion of the stream inhabited by fish, or in streams in the watershed above the fish-producing segments. Potential effects are categorized as direct, indirect, and cumulative based on potential changes in erosion, sedimentation, stream temperature, recruitment of large woody debris, and the stream nutrient cycle. Further details on impacts to fish habitat and production from proposed alternatives are discussed in the Fisheries section of this chapter.

Streamflow Regimes

Timber harvesting can potentially affect streamflow regimes by increasing the frequency and magnitude of peak storm discharges, by increasing summer base flows immediately following harvest, and by decreasing stream base flow through changes in canopy structure or stand density (Harr 1983). Forest vegetation influences stream runoff because trees and other plants use water during photosynthesis, and intercept and evaporate rain and snow. Extensive clearcut blocks may alter runoff by changing the amount of snow stored and the timing of snowmelt in the spring.

Much scientific literature addresses the effects of timber harvest on water yield from forested stream basins. These research results indicate that a minimum harvest level of 25 to 35 percent of a drainage basin is generally required before water yield increases by measurable amounts. Water yield studies in the Pacific Northwest have shown a 25 percent average increase in annual water yield for 5 to 10 years following 25 to 100 percent clearcut harvest of the study watersheds (Rothacher, 1965; 1970; Rothacher et al. 1967; and Harr 1976; 1983). No increase in fall peak flows has been observed in rain-dominated coastal watersheds except in cases where a high percentage of a watershed is compacted by roads and skid trails. Recent studies in the Pacific Northwest have shown that harvesting in the transient snow zone has increased the magnitude of winter peak runoff events in the Cascade Mountains of Oregon (Christner and Harr, 1982; Harr 1981).

Water yield responses to timber harvest activities have received very little study in Southeast Alaska watersheds. No measurable changes in streamflow were observed in the Maybeso watershed following clearcutting of 25 percent of the drainage basin (Meehan et al. 1969). An analysis of Staney Creek drainage basin following a 35 percent clearcut harvest did show significant increases in summer low flows (Bartos 1989). Several variables (elevation, aspect, basin geomorphology, soils, vegetation, geology, snow storage, and precipitation pattern, cutting unit size, distribution of units within the watershed, and scheduling of harvest entries) could all influence stream runoff.

BMP's applied in the CPOW Project Area would reduce the potential for drastic changes in streamflow regimes. By not harvesting in Class I and II riparian areas that are the major source area for summer baseflow, the potential for reducing summer lowflows and consequently reducing rearing and spawning habitat for salmonids should be low. See Mitigation Measures, Chapter 2, for a discussion of the stream buffering that will be done under all action alternatives. Where harvest units are dispersed

throughout a drainage basin, the potential for increasing the frequency of destructive rain or snow flood events should lessen.

Sediment

Some increases in sediment delivery to streams above naturally occuring rates can be expected to result from timber harvest and road construction (Rice et al. 1979; Madej 1982; Reid and Dunn 1984; Furniss et al. 1991; Chamberlin et al. 1991). Estimates of sediment delivery to Southeast Alaska streams from timber harvest indicate that sediment increases are minimal and not distinguishable from natural fluctuations in sediment yield (Paustian 1987).

Sediment will be generated in each action alternative from short-term and long-term land disturbing activities. Sediment production and delivery to streams is roughly proportional to the amount of road constructed, the amount of use, the number of stream crossings, the proximity of the road to the stream, area of timber harvested, yarding system used, and the amount of naturally produced sediment. Construction of new roads exposes soil, which may be eroded and cause sediment delivery to streams. Yarding and road construction on high or very high mass movement index soils may cause landslides that generate sediment. See the Soils section of this chapter for detailed effects of yarding and road construction and reconstruction on MMI soils.

Sediment from management activities may continue to be generated long after roads are constructed, timber is harvested, and stream crossings are in place. Maintenance of road surfaces and ditches exposes soil to erosion. As use is reduced and exposed soil becomes vegetated, the rate of erosion and delivery to streams generally will be reduced (Reid and Dunne 1984). The rate and extent of this reduction depends upon the rate of vegetation establishment. Establishment of vegetation may be enhanced by closing roads and seeding exposed soil, as may other aspects of the Access Management Plan as discussed in the Transportation section of this chapter. Use of the Prince of Wales road system will continue following project implementation; therefore, control of potential long-term sediment production from road use and maintenance will have to be continued to minimize impacts.

The extent to which stream crossings deliver sediment depends on the maintenance strategy applied after harvest. If culverts and bridges are maintained, little additional sediment is produced. If structures are left in place and not maintained, large amounts of sediment can be delivered if they fail. Removal of crossing structures and restoration of the channel would produce sediment for a short time (Stednick et al. 1978); however, cumulative sediment delivery would be greatly reduced in the future (Furniss et al. 1991).

Application of Best Management Practices (BMP's) and standards and guidelines will minimize sediment delivery to streams by controlling surface erosion from roads and harvest units. This will be accomplished by avoiding or mitigating landslide and surface erosion potential, and by proper design and installation of road drainages and stream crossings (see Chapter 2, Mitigation Measures).

The effectiveness of BMP's is primarily determined by the degree to which instream water quality meets State water quality standards. Although numerical standards are included in the Alaska State water quality regulations, measurements are difficult to routinely apply to the regulation of nonpoint sediment sources on road construction and timber sale sites. The Environmental Protection Agency (EPA) has detemined that the reasonable implementation, application and monitoring of BMP's achieves

compliance with the intent of the Clean Water Act. Water quality studies conducted in Southeast Alaska indicate that except for short-term localized deviations from numerical standards, BMP's are effective in maintaining sediment concentrations within State standards (Paustian 1987).

Consumptive Water Use

The effect of the proposed action on the consumptive uses of the water resources of the area will be insignificant in all alternatives. Application of BMP's will maintain water quality for domestic and comercial water uses, as well as the other uses identified.

Cumulative Effects

Most watersheds within the Project Area have experienced prior roading and timber harvesting. Re-entering these drainages could generate additional impacts. Legislation (TTRA) and management direction (BMP's) would largely limit most effects of sediment and increased flows from roads and harvest units. Those alternatives that harvest more in previously entered drainages are expected to have greater possible cumulative effects.

Table 3-18 displays the percent of watershed disturbed by past harvest and proposed harvest for this project by alternative. Effects are expected to be greater in those drainages with the highest percentages of harvest.

Table 3-18
Cumulative Watershed Effects, Percentage of Watershed Disturbed

VCU	Watershed Disturbed Before 1980	Allowable Watershed Disturbance* by 1996	Watershed Disturbed by 1996 Alt.1	Alt.1a	Alt.2	Alt.3	Alt.4	Alt.5
549	13	48	19	19	19	20	20	21
550	29	64	38	38	42	44	44	43
551	3	38	3	3	4	5	6	4
552	19	54	26	26	26	46	40	26
553	1	36	1	1	6	14	5	1
554	10	45	30	30	32	31	32	33
557	45	80	72	72	77	74	77	77
571	12	47	29	29	34	31	34	34
572	5	40	22	22	24	22	23	24
573	5	40	17	17	19	19	21	19
574	16	51	29	29	30	31	30	30
577	19	54	38	38	40	42	42	41
579	28	63	35	35	40	41	40	41
580	14	49	16	16	20	20	18	20
581	25	60	33	33	35	34	34	34
582	2	37	2	2	7	7	6	2
583	22	57	31	30	35	35	33	35
584	23	58	32	31	38	37	34	36
585	37	72	41	41	45	45	45	45
586	15	50	22	22	23	22	23	23
587	22	57	26	26	29	27	28	31
588	32	67	41	41	48	44	46	48
589	6	41	18	18	19	22	22	20
590	21	56	26	25	31	30	27	31
598	14	49	21	21	25	25	22	28
599	0	35	2	2	8	8	9	9
600	0	35	0	0	0	0	0	0
601	0	35	1	1	1	1	1	0

* Allowable disturbance = 35% of land base within a 15-year period.

VCU's generally follow watershed boundaries within the Project Area. Unless a cumulative watershed effects analysis is performed on watersheds within the Project Area, a 35 percent disturbance of the land base within a VCU is acceptable within a 15-year period under the standards and guidelines for cumulative effects on watersheds presented in the TLMP Draft Revision (1991a). A thorough Cumulative Watershed Effects Analysis requires intensive data inputs pertaining to watershed conditions. To date, this type of analysis cannot be performed due to lack of data. However, the 35 percent disturbance limit is based on data taken from the Staney Creek Watershed (Bartos 1989).

Ground-disturbing activities will approach 35 percent of VCU 557 within the past 15 years in all four action alternatives. VCU's 554, 571, 572, and 577 will exceed 20 percent of their ground disturbed within the past 15 years in these alternatives.

Stream Nutrient Cycling

Timber harvesting has not been shown to result in detrimental concentrations of dissolved solutes being flushed into surface water bodies (Chamberlin 1982). High concentration of dissolved nutrients that could impair drinking water or aquatic nutrient cycling are of principal concern. Research on the Hubbard Brook experimental forest in New England measured increases in dissolved nutrient concentrations resulting from clearcutting, slash burning, and herbicide treatments in small watersheds (Pierce et al. 1972). However, similar research on coastal forest watersheds measured only slight releases of key dissolved nutrients resulting from clearcutting and slash burning treatments (Fredriksen 1971). In Southeast forest ecosystems, dissolved nutrients are tightly bound by soil organic matter and plant root hairs. Soil and water chemistry monitoring on a small subbasin that was clearcut and burned in the Pavlof drainage near Tenakee, Alaska, measured no loss in total nitrogen and only slight leaching of potassium, magnesium, and phosphorus into surface water (Stednick et al. 1982). The results of these investigations suggest that no measurable effects on chemical water quality or aquatic productivity would occur as the result of clearcut harvesting in the CPOW Project Area.

FISHERIES

Affected Environment

Key Terms

Aelvin - newly hatched salmon that are still attached to the yolk sac
Adfluvial - fish that ascend from freshwater lakes to breed in streams
Alluvial fan channel - a fan-shaped deposit of sand, gravel, and fine material made by a stream where it runs out onto a level plain or meets a slower streem
Anadromous - fish that ascend from the sea to breed in freshwater streams
Aquatic Habitat Management Unit (AHMU) - areas for managing the resources associated with streams and lakes
Channel types - the defining of stream sections based on watershed runoff, landform relief, and geology
Glide channel - channel types that occur on lowlands and landforms, and are mostly associated with bogs, marshes, or lakes
Large Woody Debris (LWD) - any large piece of relatively stable woody material having a diameter of at least 10 centimeters and a length greater than one meter that intrudes into a stream channel; also called Large Organic Debris (LOD)
Management Indicator Species (MIS) - species whose population changes are believed to best indicate the effects of land management activites; fish MIS for CPOW are coho and pink salmon and Dolly Varden char
Salmonid - refers to the group of fishes to which salmon belong
Watershed - area that contributes runoff water to a waterway

Introduction

Abundant aquatic resources in the CPOW Project Area provide a number of diverse fish spawning and rearing habitats in the CPOW Project Area. Four species of salmon (pink, chum, sockeye, and coho), two species of trout (cutthroat and rainbow, including sea runs of cutthroats and steelhead trout), and one species of char (Dolly Varden) inhabit the freshwater within the area. These fish species are valuable not only for the commercial fish industry, resident sport fisheries, subsistence use, and charter boat/lodge operators, but also as a valuable food source for bears, eagles, and other wildlife. A number of nongame fish species including sculpin, stickleback, and smelt occur in Project Area waters (Taylor 1979).

Anadromous fishes spend at least part of their life in freshwater and part in saltwater. Salmon lay their eggs in stream gravels, and the juvenile fish hatched from the eggs emerge from the gravels. Depending on the species of salmon, the amount of time the juveniles spend in freshwater is variable. Pink salmon immediately start their downstream migration, while coho salmon juveniles may spend more than two years in freshwater before migrating to the ocean. Pink and chum salmon are especially dependent on estuaries during their early life stages. Salmon reach maturity out in the

ocean, only to return to their natal streams to start the cycle again. Steelhead trout follow the same cycle as coho salmon, except they often survive the spawning season, return to the ocean, and complete the cycle again.

Adfluvial fishes such as resident trouts and chars spend all of their life in freshwater, spawning in stream bed gravels and growing to maturity in the streams and lakes of the area.

Estuaries are unique systems because they form transitions between terrestrial, freshwater, and marine environments. Estuaries are rich and diverse, harboring many resident species and providing food, spawning areas, or shelter for numerous other species at critical points in their life cycle (USDA Forest Service 1985). On Prince of Wales Island, crab, shrimp, clams, mussels, and various marine fishes are associated with the estuaries and surrounding waters which form a nursery for their young. Herring and smelt also use these areas for spawning and feeding.

Cave systems found on Prince of Wales Island also provide unique habitat important to the fisheries of the area. Karst (limestone) waters flowing into and through caves are extremely productive and are used by salmon and other fishes for feeding, protection from predators, shade, and for spawning. See the Cave Resources section of this chapter for details.

Fish Habitat

Fish habitat is described and categorized in several ways, including: (1) stream classification, (2) Aquatic Habitat Management Units (AHMU's), (3) watersheds, and (4) habitat capability.

Stream Classification

Three classifications of fish use of streams have been identified for the Tongass National Forest. The three stream classes are also used to define AHMU classes in the AHMU Handbook (FSH 2609.24). The definitions are as follows:

Class I. Streams with anadromous or adfluvial lake and stream habitat. Also included is the habitat upstream from migration barriers known to be reasonable enhancement opportunities for anadromous fish, and habitat with high value resident sport fish populations.

Class II. Streams with resident fish populations and generally steep (6–15 percent) gradient. These fish have limited sport fishing values.

Class III. Streams with no fish populations but with potential water quality influence on the downstream aquatic habitat.

All mapped streams in the CPOW Project Area have been assigned a channel type (USDA Forest Service 1987). Channel typing as developed on the Tongass National Forest is an inventory and planning tool that stratifies stream and lake sections within a watershed into different stream process groups. The process groups are based on physical characteristics of streams and predict their physical response to different management activities. For an in-depth description of stream process groups, see Appendix D of the TLMP Draft Revision, Proposed Revised Forest Plan (USDA Forest Service 1991a). For management requirements, see Appendix I of the TLMP Draft Revision, pp.12–20 (USDA Forest Service 1991a).

STREAM CLASSES

Class I Streams: provides high quality habitat for anadromous and sport fish

Class II Streams: provides habitat for resident fish, but has limited sport fishing value

Class III Streams: have potential influence on water quality of downstream aquatic habitat

Channel types are used to assign stream classes, particularly if stream-specific information is unavailable. Of the 1,922 miles of streams in the Project Area, some 950 miles were channel typed. Approximately 530 miles of stream in the Project Area are classed as accessible to anadromous fishes (Class I), and 140 miles are inhabited by resident fishes (Class II). (See Table 3-21.)

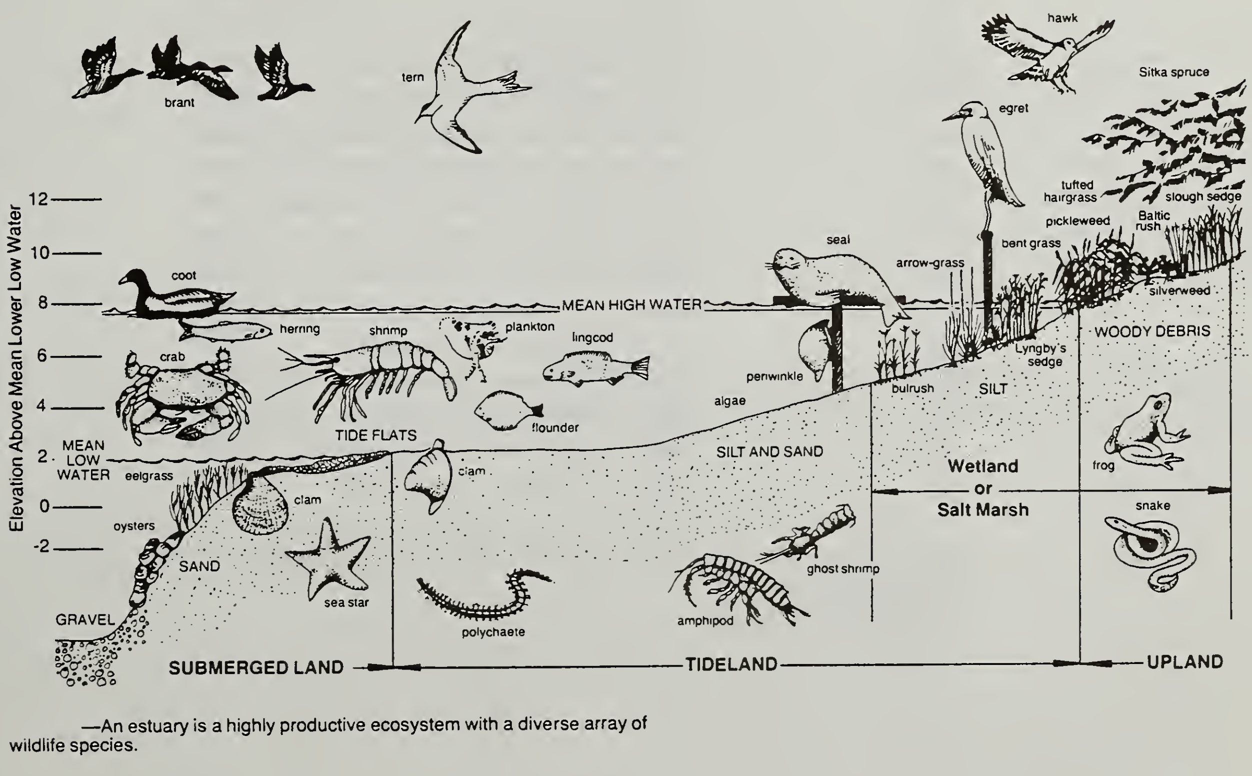
There are numerous streams within CPOW that have been neither channel typed nor stream classed. These streams were identified using aerial photos and topographic maps during the logging/transportation design phase of the project. These streams will be classified and channel typed during subsequent field reconnaissance, and the appropriate management prescriptions will be applied.

Channel types are also an indicator of the amount and quality of fish habitat within the CPOW Project Area. The amount and quality of rearing habitat predicted by the various channel types has been established through field studies within the Tongass National Forest (Murphy et al. 1987).

Aquatic Habitat Management Unit Designation (AHMU)

Aquatic Habitat Management Units (AHMU's) are areas for management of the resources associated with streams and lakes. AHMU class designations reflect integrated resource management considerations for fish habitat, forest type, geology, soils, topography, and water quality. See the AHMU Handbook (FSM 2526.03 and FSH 2609.24) for further details on AHMU definitions.

AHMU widths are classified for the area according to the stream channel type that is present within the specific AHMU. The physical characteristics and channel type sensitivities, and upland management influences within the AHMU, can be evaluated based on the inventoried conditions and responses of the channel types. Table 3-19 displays the AHMU widths along both sides of streams and lakes.



—An estuary is a highly productive ecosystem with a diverse array of wildlife species.

Table 3-19
AHMU Widths Along Lakes and Streams

Channel Type*	Stream Process Group	Minimum Distance (ft.)
B1	Floodplain	200
B8	Floodplain	200
C1	Floodplain	200
C3	Floodplain	200
C4	Floodplain	200
C6	Floodplain	200
D4	Floodplain	200
D5	Floodplain	200
D8	Floodplain	200
A3	Alluvial Fan	100**
B5	Alluvial Fan	100**
D1	Alluvial Fan	100**
D6	Alluvial Fan	100**
L1	Placid or Glide Stream	100
L2	Placid or Glide Stream	100
L3	Lakes and Ponds	100
L4	Lakes and Ponds	100
L5	Lakes and Ponds	100
E	Estuary	1,000
E1	Estuarine	500
E2	Estuarine	200
E3	Estuarine	200
E4	Estuarine	200
E5	Estuarine	500
B2	Mixed Control	100**
B3	Mixed Control	100**
D3	Mixed Control	100**
C2	Low Gradient Contained	100
C5	Low Gradient Contained	100
B4	Moderate Gradient Contained	100**
B6	Moderate Gradient Contained	100**
B7	Moderate Gradient Contained	100**
A1	High Gradient Contained	100**
A2	High Gradient Contained	100**
A4	High Gradient Contained	100**
A5	High Gradient Contained	100**
A6	High Gradient Contained	100**
A7	High Gradient Contained	100**
D2	High Gradient Contained	100**
D7	High Gradient Contained	100**

* For descriptions see Channel Type Field Guide, USDA Forest Service 1987.
** If stream Class I or II.
SOURCE: FSH 2609.24.

Table 3-20 displays the overall condition of AHMU's by process group when totaled for the CPOW Project Area. This table shows the amount of AHMU in acres, the amount previously harvested before the Tongass Timber Reform Act (TTRA) was enacted, and the percentage of the total AHMU acreage previously harvested.

Table 3-20
Status of AHMU's

Stream Process Group	Channel Type*	Total AHMU Acres	AHMU Acres Harvested	Previous % Acres Harvested**
Floodplain	B1,B8,C1,C3,C4 C6,D4,D5,D8	3,026	666	22
Alluvial Fan	A3,B5,D1,D6	393	198	50
Placid or Glide stream	L1,L2	3,711	452	12
Lakes and Ponds	L3,L4,L5	1,435	114	8
Estuaries	E1,E2,E3,E4,E5	261	13	5
Mixed Control	B2,B3,D3	2,112	724	34
Low Gradient Contained	C2,C5	325	128	41
Mod Gradient Contained	B4,B6,B7	1,040	101	10
High Gradient Contained	A1,A2,A4,A5,A6 A7,D2,D7	1,368	402	29
TOTAL		13,671	2,798	20

* For descriptions see Channel Type Field Guide, USDA Forest Service 1987.
** Pre-TTRA

Watersheds

There are more than 1,922 miles of streams within the CPOW Project Area. The Project Area can be broken down into a number of watersheds, or areas that contribute runoff water to a particular waterway. Such a breakdown enables biologists to evaluate various management activities on fish habitat and its capability to produce fish. Most of the watersheds within the Project Area are small, usually about five to ten square miles. Many of these watersheds contain streams that have no name other than the Alaska Department of Fish and Game Anadromous Stream Catalog number. For a summary of miles of stream in the Project Area, see Table 3-21.

In addition to streams, the CPOW Project Area has approximately 7,213 surface acres of lakes and approximately 114 acres of estuaries. These areas also provide high quality salmonid habitat.

Table 3-21
Miles of Class I, II, and III Streams for the Project Area, by Wildlife Analysis Area (WAA)*

WAA	Cl I	Cl II	Cl III	Not Classified**	Total No. Miles
1315	91.2	23.8	51.4	120.7	287.1
1319	34.6	8.5	40.9	79.7	163.7
1420	53.4	20.1	62.0	68.1	203.6
1421	117.0	26.5	34.8	143.0	321.3
1422	171.8	36.3	70.1	507.7	785.9
1527	13.3	7.6	6.3	8.6	35.8
1530	48.3	17.7	14.7	44.6	125.2
TOTAL	529.5	140.5	280.2	972.4	1,922.6

* For definition and discussion of WAA's, and for a map of the WAA's in the CPOW Project Area, see the Wildlife section of this chapter.
** These streams, plus any other new streams found during field recon for final layout, will be classified and the proper AHMU requirements applied.

It is common for several species of anadromous salmon and trout to use the same reach of stream for migration, spawning, and rearing. Where resident fish occupy the same reaches of the stream as anadromous salmonids, the resident trout are not found in large numbers. Several watersheds within the Project Area were identified as high quality sport fishing systems, including the Thorne River system, Sarkar system, Staney Creek, Luck Lake, and Sweetwater Lake system (FSH 2609.24).

Habitat Capability

Large Woody Debris. Large woody debris (LWD)—trees and tree pieces greater than four inches in diameter and 10 feet long—is one of the most important components of high quality fish habitat. Also known as Large Organic Debris (LOD), this material provides food and building materials for many aquatic life forms, provides cover for juvenile and adult fish, and is the primary channel-forming element in some channel types.

Gradual entry of LWD into the aquatic system is desirable to maintain stream habitat diversity and stability. Large amounts entering abruptly can be detrimental to the aquatic ecosystem by becoming a physical barrier and causing bank erosion and channel migration problems. In most cases, however, gradual and consistent input of LWD is important to maintain stream productivity.

Past National Forest management practices have reduced the total amount of large in-channel woody material in some streams on the CPOW Project Area. Prior to the enactment of TTRA, timber often was harvested to the edge of the streams, and stream cleaning operations were commonly conducted to prevent perceived fish passage problems.

Stream Temperature. Summer high and winter low water temperatures influence fish survival and condition. Water temperature affects the metabolic rate of aquatic organisms and can affect the migration timing of adult and juvenile fish. Small changes in water temperature can affect emergence of fry from the gravels and have a fairly large effect on eventual adult survival (Holtby and Scrivener 1989). Harvest of streamside vegetation, as well as the total amount of harvest in a watershed, can affect water temperature.

Some stream systems are particularly sensitive to high temperatures, including slow-flowing streams with southerly aspects, and streams with shallow lake and muskeg sources. Timber harvest to the streambank is suspected of raising stream temperatures to a level which may contribute to adult fish kills. Data has been compiled by the Alaska Working Group on Cooperative Forestry/Fisheries (Gibbons 1989) on all known instances of fish kills in Southeast Alaska. The data indicate that fish kills have occurred in both logged and unlogged areas. Further identification of the relationships between fish kills, factors causing these fish kills (such as temperature, long periods of reduced rainfall, numbers of returning salmon, dissolved oxygen content, tidal flow and watershed characteristics), and the relationship to timber harvest practices, was identified by the Alaska Working Group on Cooperative Forestry/Fisheries (USDA Forest Service 1991c).

The first phase of the identification of the reasons for fish kills was conducted during the summer of 1990 on seven streams on Prince of Wales Island, under the direction of the Alaska Working Group on Cooperative Forestry/Fisheries Research (Pentec Environmental, Inc. 1991). The research was designed to address the physical in-stream reasons for adult fish kills (also known as pre-spawner mortality). Although no actual fish kills were observed, the conclusions of the study included:

1. Fish respiration by adult spawners can cause significant reductions of dissolved oxygen concentration during summer low flows;
2. Dissolved oxygen reductions caused by fish respiration can occur at water temperatures well below lethal levels;
3. Stream discharge and spawner abundance were the primary factors controlling dissolved oxygen levels during the spawner migration period in the study streams; however, the analysis indicates that fish activity levels could also be important;
4. Low dissolved oxygen concentration as a result of fish respiration in fish holding pools is the most likely factor causing salmon pre-spawner mortality; and,
5. An increase in water temperature will decrease the potential availability of dissolved oxygen and simultaneously increase dissolved oxygen needs of fish, but the effects of these factors on dissolved oxygen concentration are dependent on stream discharge.

Low winter temperatures can lead to detrimental winter stream conditions, such as anchor ice formation and freezing of spawning gravels, which can reduce pool size. Low temperatures may be aggravated by removing streamside vegetation. However, estimating the effects is very difficult because of the influences of intermittent snow or ice cover and high variability in winter air temperature, and the influence of wind and precipitation patterns commonly found in Southeast Alaska.

Because the Forest Service complies with TTRA and Forest Plan stream protection measures, it is unlikely that any Project Area streams will be subjected to increased or decreased temperatures from timber harvest.

Sedimentation. Aquatic productivity can be influenced by the concentration of sediment in the water column and the amount of fine sediment introduced into spawning gravel. Direct impacts from sediment concentration include filling gravel pore spaces, which reduces water circulation necessary for fish egg survival and development. Sediment also retards emergence of the young fish after hatching. Young fish can die within the gravel if fine sediment blocks movement through gravel to open water. During winter, young salmonids use spaces between gravel and rubble to escape the effects of low water temperatures and ice. When these spaces fill with sediment, the young fish must use energy to maintain themselves in the current, thereby reducing survival. Also, salmonids are generally sight feeders, and turbid water reduces their feeding efficiency.

Suspended sediment may also irritate the mouth and gills of young fish and, if persistent, can erode the gills of larger fish. Such damage may increase fish stress, leading to increased susceptibility to disease. Sediment indirectly affects fish by reducing populations of aquatic insects which are important fish food, thereby reducing the number of fish that can be produced from a stream section. Also, as rearing pools fill with sediment, rearing space is reduced, lowering habitat capability, and increasing stress and vulnerability to predators.

Fish productivity is limited by the nutrient content of the water, type of debris, low pool-riffle ratio, and high cobble/bedrock embeddedness. The maintenance of woody riparian vegetation is important as a source of nutrient input and as a source of debris to create pools and trap sediment in the stream.

Management Indicator Species

Management Indicator Species (MIS) are species of vertebrates and invertebrates whose population changes are believed to best indicate the effects of land management activities (USDA Forest Service 1982). Through the MIS concept, the total number of species occurring within a project area is reduced to a manageable set of species that collectively represent the complex of habitats, species, and associated management concerns. The MIS are used to assess the maintenance of population viability, changes in biological diversity, and effects on species in public demand.

In the CPOW Project Area, coho and pink salmon have been selected as MIS for anadromous fish species, and Dolly Varden char as MIS for resident species.

Coho (silver) and pink (humpback) salmon were selected to represent two different phases of salmon life history: spawning/egg incubation and freshwater rearing. Pink salmon, the most widely distributed of the salmon, spawn in freshwater from July through September. Immediately upon emergence from gravels, juveniles go to sea, where they mature in two years. Pink salmon are important to the commercial fishery of Southeast Alaska, where they represent the greatest poundage harvested; an average of 85 million pounds were harvested between 1979 and 1988 (USDA Forest Service 1991a). The only limiting factor for pink salmon freshwater habitat capability is the quantity and quality of spawning gravel. Changes in pink salmon numbers are primarily due to predation from other fish, birds, and mammals, including humans. There is no empirical evidence in Southeast Alaska that pink salmon have been affected by logging or road construction. This could be attributed, among other reasons, to high variability in sediment flushing rates in Southeast Alaska streams.

Coho salmon also spawn and incubate in freshwater, but after emergence from the gravels, juvenile coho rear in streams and ponds for two years before migrating to the

ocean, where they mature in two years, reaching 6 to 20 pounds. Coho are important to the commercial troll fishery and marine sport fishery of the region. An average of 1.67 million fish per year between 1979 and 1988 (USDA Forest Service, 1991a) were harvested in Southeast Alaska. Because cohos spend more time in freshwater, habitat capability for this species is limited not only by the quantity and quality of spawning gravel, but also by the ability of the freshwater to support overwintering young salmon. Pools formed by large woody debris provide this overwintering habitat. Mandatory 100-foot minimum buffers will provide a continuous supply of LWD to Class I streams, and Class II streams flowing into Class I streams, preserving their productivity.

Dolly Varden char were selected to represent resident fish habitats because of their wide distribution, availability of data on the species' habitat requirements, and distribution over the full spectrum of resident fish habitats. Dolly Varden are also present in their anadromous form in the area.

Fish habitat capability (production) is listed in Table 3-22 by VCU and represents the estimated potential for each watershed to produce coho and pink salmon and Dolly Varden char. Determining precisely how many fish are produced from a given channel type is difficult because the fish may use a variety of areas at different points in its life. For example, a coho spawning in suitable gravels on the tail end of an alluvial fan channel may proceed to the estuary for summer rearing and a period of rapid growth in a more fertile environment. This same fish might then return upstream to a glide channel offering sufficient overhead cover for overwintering. The estimated total production potential of the CPOW Project Area is 5,054,345 pink salmon, 141,892 coho salmon, and 2,013,293 Dolly Varden char. This does not include fish habitat capability for species such as sockeye salmon, chum salmon, steelhead trout, and cuttroat trout.

Table 3-22
Habitat Capability for Coho Salmon, Pink Salmon and Dolly Varden Char by VCU

VCU	Name	Coho Salmon Capability* (Adult Fish)	Pink Salmon Capability* (Adult Fish)	Dolly Varden Capability** (Smolts)
549.1	Sarheen	734	14,928	17,232
549.2	Sarheen			25,499
550	Neck Lake	1,307	34,229	34,915
551	Whale Pass	896	20,673	38,682
552	Barnes Lake	1,088	18,617	17,593
553	Mabel Creek	3,575	57,187	58,643
554.1	Sarkar	9,494	176,320	122,980
554.2	Sarkar	2,363	59,109	55,347
557	Tuxekan Narrows	378	13,668	20,355
571	Naukati Bay	7,301	166,961	113,331
572	Coffman Cove	10,349	182,464	48,686
573	Sweetwater	9,040	364,174	151,978
574	Hatchery Creek	10,112	515,949	149,639
577	Logjam Creek	16,253	636,762	187,764
579	Falls Creek	2,090	165,874	38,246
580	North Thorne	5,573	270,612	62,088
581	Luck Lake	3,781	281,324	63,142
582	Baird Peak	27	1,623	4,189
583	Ratz	9,704	206,516	40,001
584	Little Ratz	1,460	96,335	38,991
585	Narrow Point	2,556	147,300	41,870
586	Thorne Bay	1,667	17,270	46,046
587.1	Tuxekan Passage	997	30,021	31,504
587.2	Tuxekan Passage			7,764
588	Staney	19,196	813,960	251,289
589	Shaheen	5,383	313,971	86,019
590	Upper Staney	4,411	288,631	60,181
593				94,088
598	Salt Chuck	11,811	137,176	57,909
599	Tolstoi	346	22,691	37,584
600				9,776
TOTAL		141,892	5,054,345	2,013,293

* SOURCE: LTS EIS.
** SOURCE: TLMP Dolly Varden Habitat Capability Model Run for 1988.

Using the number of adult fish and multiplying that number by the average weight of pink (3.3 lb.) and coho (7.7 lb.) salmon will give an estimated poundage available to commercial, sport and subsistence fisheries from the CPOW Project Area. To estimate the poundage of sockeye and chum salmon produced from the Project Area, the percentage by species commercially harvested in Southeast Alaska from 1978 through 1987 was used (king=3 percent, coho=10 percent, sockeye=6 percent, pink=67 percent

and chum=14 percent). Table 3-23 displays pounds of commercial fish produced from the Project Area.

Table 3-23
Commercial Fish Production From the CPOW Project Area, in Pounds

Coho Salmon	Sockeye Salmon	Chum Salmon	Pink Salmon
1,092,568	1,384,824	3,231,256	16,679,339

SOURCE: TLMP 1979a, as amended

For discussions of other physical factors contributing to fish habitat quality and quantity—including sedimentation, water chemistry, and streamflow regimes—see the Soils and Water Resources sections of this chapter.

Effects of the Alternatives

The National Forest Management Act (NFMA) sets the minimum standard for fish habitat protection on all national forests. The Tongass Timber Reform Act (TTRA) further provides specific direction for fish and riparian protection for the Tongass National Forest.

The NFMA requires that no serious and adverse effect occurs to fish habitat; NFMA (36 CFR 219.27 (e)) states, in part:

> "No management practices causing detrimental changes in water temperature or chemical composition, blockages of water courses, or deposits of sediment shall be permitted within these areas [riparian areas] which seriously and adversely affect water conditions or fish habitat."

In addition, the current TLMP (1979a, as amended in 1986) has as a goal to:

> "maintain and enhance the natural fisheries resources by managing some of the highest quality watersheds in ways which would not modify them significantly. In those where major management activities will take place, adequate protection of the aquatic environment will be provided. In addition, it is the intent to take advantage of as many identified fisheries enhancement opportunities as possible."

The TTRA provides direction for fisheries protection in section 103(a). The objective of this section of TTRA is to assure the protection of riparian habitats and to protect fisheries through the application of buffer zones not less than 100 feet in width and through the application of Best Management Practices (BMP's). The Act reads:

> (a) Section 705 (16U.S.C. 539d) of ANILCA is amended by adding at the end thereof the following new subsection: "(e) In order to assure protection of riparian habitat, the Secretary shall maintain a buffer zone of no less than one hundred feet in width on each side of all Class I streams in the Tongass National Forest,

and on those Class II streams which flow directly into a Class I stream, within which commercial timber harvesting shall be prohibited, except where independent national forest timber sales have already been sold..... The Secretary shall use best management practices, as defined in the Region 10 Soil and Water Conservation Handbook (FSH 2509.22), January 1990, to assure the protection of riparian habitat on streams or portions of streams not protected by such buffers zones. For the purposes of this subsection, the terms 'Class I streams' and 'Class II streams' means the same as they do in the Region 10 Aquatic Habitat Management Handbook (FSH 2609.24), June 1986."

Direct, Indirect, and Cumulative Effects

Fish Habitat

Timber harvest has potential positive and negative effects on fish habitat capability. Timber harvest may affect the sources of large woody debris, stream stability, and water quality, but these effects are mitigated by TTRA buffer requirements. Timber harvest, under some circumstances, may have a positive effect on fish by increasing the amount of primary productivity in a stream system. However, these potential positive effects, which are generally only seasonal in nature, are not quantitified in this assessment. Also, timber harvest may fund habitat improvement projects through Knudson-Vandenburg (KV) funds. KV funds are made available from timber sale receipts and can be used for the enhancement of nontimber resources. Some potential KV enhancement projects may include: maintenance and monitoring of the Big Lake and Rio Roberts fish passes; fish habitat/basin rehabilitation of Luck Creek, Slide Creek, Sal Creek, Ratz Creek, Gutchi Creek, Yatuk Creek, and Staney Creek; and a fish pass structure on North Staney Creek (information taken from the Ketchikan Area 10-year summary, in the TLMP Draft Revision, 1991a). These will require additional NEPA analysis before actual implementation.

Analysis completed in the TLMP Draft Revision (1991a, Vol. 149, 3-109), shows that forest-wide there is no measurable variation in fish habitat capability among different harvest levels. Present and future habitat capability for coho salmon is unchanged, there is a 2.5 percent increase for pink salmon, and a slight decrease in Dolly Varden habitat capability, even without any enhancement projects.

The habitat capability models predict that there would be no measurable reduction in coho capability from CPOW alternatives, since coho use only Class I streams and there is no reduction in large woody debris within 100 feet of streams (except occasional road crossing or yarding corridors). Dolly Varden inhabiting Class I streams and Class II streams that flow directly into Class I streams will not be affected by commercial timber harvest from CPOW's alternatives. The Dolly Varden Char Habitat Capability Model predicts a 3.5 percent decrease in habitat capability (from 2,013,293 smolts in 1988 to 1,938,181 smolts in 2035). There is not a significant change in habitat capability with regards to which alternative is selected.

Pink salmon habitat capability relies on survival in the spawning gravels during the egg incubation period. A number of studies have shown a relationship between egg survival and water quality criteria, including intergravel sediment, temperature, water flow, and other factors (Reiser and Bjornn 1979). Studies and analyses of Southeast Alaska's pink salmon including relationships between instream sediments, egg survival, and pink salmon returns to streams have been conducted (Sheridan et. al. 1984; Pella and Myren 1974). None of these studies has provided a conclusive link between upland management and reduced numbers of returning fish. This may be because of the sensitivity of the biological investigations or because other limiting factors (for

example, ocean survival) may be more significant than those in the freshwater life stage.

While a direct link has not been established for pink salmon in Alaska, as it has been for other salmonids elsewhere, it would be prudent to minimize sediment delivery to pink salmon streams. The implementation of BMP's and Tongass Timber Reform Act legislation establishing buffer strips should minimize impacts from sedimentation.

With implementation of any of the alternatives, no substantial reductions are predicted for pink salmon. However, with increased development activities, there is added risk of unplanned stream-habitat impacts (such as accelerated numbers of landslides over background levels, blowdown of leave strips, and the subtle impacts that may result from stream reactions to rain-on-snow events), and added risk of the cumulative effects of many small but individually insignificant actions affecting fish habitat capability. This risk of unplanned events and cumulative effects is related to the amount of timber harvest, rate of harvest, and location of harvest units within a watershed. Although the amount of risk cannot be quantified, the frequency of such events in the past has been low, and the risk of future unexpected detrimental effects should be minimal because of the implementation of standards, guidelines, and other protective measures.

Harvest on MMI 3 (high mass movement index) soils, miles of road construction and reconstruction, and the number of stream crossings, are indicators of this potential increased risk. For a comparison of acres harvested by alternative on MMI 3 soils, acres of road construction by alternative, and number of stream crossings by alternative, see the Soils section of this chapter.

Log Transfer Facilities

The effects of log transfer facilities (LTF's) on fisheries resources have not been quantifiably demonstrated.

There is no formal documentation that LTF structures or activities associated with their use conflict with commercial fishing near the facility. If a facility were located in a small bay or cove, it is possible that there could be some difficulty maneuvering around log rafts or moored barges to get to favored fishing sites. No adverse consequences on commercial fishing or subsistence uses of marine resources are anticipated as the result of LTF location.

Camps associated with LTF sites can lead to additional use of fisheries and marine resources. There is no data currently available on the amount of additional use occurring at various camp locations in the Project Area. The competition for resources at or near logging camp locations would probably increase. There is currently little or no information to indicate that resource allocation problems have occurred as the result of a logging camp. The boards of fisheries and game can control the amount of harvest by setting bag limits, shortening season lengths, or by instituting a complete closure of a fishery.

For a discussion of the effects of LTF's on the marine benthic environment see the Transportation section of this chapter.

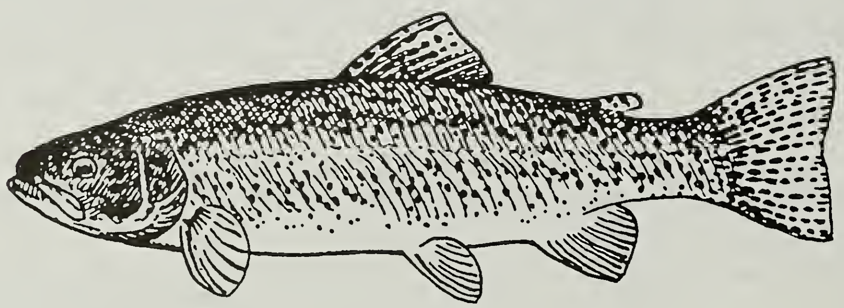
Aquatic Habitat Research Within the CPOW Project Area

The Aquatic Land Interaction Research Program of the Forestry Sciences Laboratory, Juneau, Alaska, in cooperation with Montana State University and the University of Idaho, has been conducting research to quantify winter residence and survival of coho salmon and debris stability in second growth streams as compared to streams in old growth.

Baseline data was collected from an old-growth stream, Aha Creek, and is the benchmark used in conjunction with data from second-growth streams in the Staney Creek drainage. Information and scientific papers have been published on fish population density and species composition, effect of stream cleaning, relation of cover to standing crop of coho salmon, and overwinter survival requirements of juvenile salmonids.

Harvest unit 588-225 is located within the old-growth watershed of Aha Creek. This unit is proposed for harvest in Alternatives 2, 4, and 5. The unit is 62 acres in size and has approximately 2 MMBF of timber. Harvest of this unit may have a detrimental effect on the ongoing research.

Instead of eliminating this unit from consideration, there may be an opportunity to take advantage of the long-term studies that have been completed, and design another study to determine the effectiveness of TTRA buffers. This decision will be coordinated between the Forest Supervisor and the Forest Sciences Laboratory and documented in the ROD.



TIMBER AND VEGETATION

Key Terms

Commercial Forest Land (CFL) - land that is capable of producing continuous crops of timber (20 cubic feet of tree growth annually, or at least 8 MBF)
Even-aged - management that results in the creation of stands in which trees of essentially the same age grow together
MBF - thousand board feet
MELP - Multi Entry Logging Plan - interdisciplinary design and mapping of all potential timber harvest units, including associated logging and transportation systems, within a project area
Mid-market analysis - an economic estimate of timber value at a point in time when half of the timber was harvested at a higher value and half was harvested at a lower value
MMBF - million board feet
Overstory - the portion of trees in a forest that forms the uppermost layer of foliage; also called the canopy
Partial cut - method of harvesting trees where any number of live trees are left standing in any of various spatial patterns; not clearcutting
Regeneration - the process of establishing a new crop of trees on previously harvested land
Reserved - lands that have been withdrawn from the timber base by an Act of Congress, the Secretary of Agriculture, or the Chief of the Forest Service
Uneven-aged - management techniques that results in the creation of stands that exhibit a range of diameter or age classes

Affected Environment

Southeast Alaska's forest and nonforest vegetation is valuable for ecological, aesthetic, economic, cultural, recreational, and subsistence reasons. Timber harvesting is an important component of the economy of the region. Over the past two years, more than 6,000 jobs have been directly or indirectly produced by timber harvesting. In addition, 25 percent of all timber revenues collected by the USDA Forest Service is returned to the state for use on roads and schools. In 1990 almost a million dollars were returned to the state.

Plant Series and Vegetation Distribution

The natural vegetation of the CPOW Project Area is a mosaic of coniferous forest interspersed with alpine tundra, muskeg (bog), shrubland, estuary, and beach fringe plant communities. The Project Area has been classified into forested plant associations based on the climax plant community (DeMeo 1989), which results from the interaction between landform, climate, and soils. All forested plant associations

having the same climax tree(s) are referred to as a series; the series name is based on the climax tree(s). The CPOW Project Area has seven plant series.

Sitka Spruce Series

Plant associations in this series are generally associated with riparian areas and disturbed sites such as stringers between avalanche chutes. This series can also occur in combination with mountain hemlock at higher elevations. Sitka spruce is the dominant overstory tree species, but western hemlock can be a co-dominant. Red alder may also be present. Common shrub species include devil's club, blueberry, and salmonberry. Ferns and skunk cabbage are the dominant herbs. The Sitka spruce series is generally highly productive, and the heights of mature spruce often exceed 150 feet.

Western Hemlock Series

The majority of sites harvested to date on the Project Area have been of the Western Hemlock Series. Plant associations in this series generally occur in the uplands on mountain-, hill-, and footslopes with moderate to well drained soils. The predominate overstory tree species is the western hemlock, but Sitka spruce occurs in the overstory in numbers related to the frequency of disturbance. The shrub layer is dominated by blueberry and rusty menziesia; devil's club, however, can be a major component in some areas. Bunchberry and five-leaf bramble dominate the herb layer, but skunk cabbage can be a major component in areas with poorly drained soils. Plant productivity is generally high, with mature hemlock often exceeding heights of 125 feet.

Most sites harvested to date on the Project Area have been of the Western Hemlock Series, occurring in the uplands on moderate to well drained soils.

Mountain Hemlock Series

These plant associations are generally found on cold high-elevation sites above the western hemlock series. Mountain hemlock is the dominant overstory tree species, with Sitka spruce and yellowcedar occurring to a lesser degree. The shrub layer is dominated by blueberry. As the alpine (treeless) zone is approached, copperbrush and cassiope become more common. Deer cabbage is a common herb. Plant productivity is limited by the shorter growing season at high elevations and by reduced soil drainage common to some of the associations.

Mixed Conifer Series

Mixed conifer associations designate sites with limited productivity due to poor soil drainage or shallow soil, or both. These plant associations generally occur in the uplands, often near muskegs. Dominant overstory tree species are mountain hemlock, western hemlock, western redcedar, and yellowcedar. Sitka spruce and shore pine can also occur. Blueberry and rusty menziesia are the dominant shrub species; on the southern portion of the CPOW Project Area, salal can also be locally abundant. Dominant herbs vary and include skunk cabbage, five-leaf bramble, deer cabbage, and ferns.

Western Hemlock-Yellowcedar Series

This series can be considered a subset of the western hemlock series on the Ketchikan Area. It is most common on mountains and hillslopes around 1,000 feet elevation, but can be found from sea level to the subalpine zone. Dominant overstory tree species are western hemlock and yellowcedar; western redcedar may also be present. Blueberry is the dominant shrub, with rusty menziesia common. Dominant herbs vary and include ferns, bunchberry, dogwood, skunk cabbage, and five-leaf bramble. Site productivity is best described as moderate.

Western Hemlock-Western Redcedar Series

This series represents a transition from the less productive, more poorly drained mixed conifer series, to the more productive, better drained western hemlock series. It occurs on a wide variety of landforms, but is most characteristic of rolling hill country, and lower hill- and mountainslopes. Near the northern limit of its range, redcedar growth is limited by light and temperature. Consequently, while it may be found up to 1,000 feet above sea level, it is most common below 500 feet.

The overstory is dominated by western hemlock. Redcedar commonly occupies 10 to 25 percent of the forest canopy. Yellowcedar may also occur. Other species are incidental. The understory is characterized by blueberry, although salal may be locally common on warmer sites below 500 feet elevation. Site productivity is typically low to moderate on rolling hills and moderate to high on hill- and mountainslopes.

Shore Pine Series

This group of associations is on the transition line from mixed conifer to nonforest muskeg. Soils are poorly drained and productivity is very low. Because of the abundant light available, understory vegetation is very diverse. Muskeg plants such as Labrador tea, crowberry, bog kalmia, bog blueberry, and sedges are common. Salal may occur on some sites.

Nonforest Plant Communities

Various nonforest plant communities occur in estuaries, riparian areas, muskegs, alpine meadows, and alpine lichen rock outcrops in the CPOW Project Area.

Southeast Alaska represents the extreme northern extent of the range for Pacific yew, which has received much national attention as a result of preliminary research which indicates it may have use in treatment of some forms of cancer. The species tends to be found within 500 feet of saltwater, as it requires the warm marine environment to exist at this latitude. It is not very abundant, and exists in only a limited amount, if at all, in the CPOW Project Area.

Nonforest wetlands are described in DeMeo and Loggy (1989). Estuary tidal flats are inundated by high tides. Vegetation consists primarily of sedges, red fescue, and sea milkwort. Bluejoint and sedges dominate on low terraces, which are rarely inundated by tides but have high water tables. This also includes unvegetated mud flats.

Shrub riparian areas are found on highly active floodplains and are frequently disturbed. Soils are generally deep and well drained, but flood frequently. Salmonberry, stinkcurrant, devil's club, and ferns are the dominant vegetation.

Muskegs are most often characterized by stunted yellowcedar and shore pine, along with sedges and other bog vegetation. Muskegs dominated by sphagnum moss or tall sedge cover smaller areas. The water table is at the surface, and numerous small ponds are scattered throughout the muskeg.

Alpine meadows are dominated by cassiope and mixed forbs including mountain heather. These meadows are found on steep, well-drained rock outcrops at high elevation. Alpine lichen rock outcrops are found at high elevations above timberline. Plant cover does not exceed 50 percent. Species diversity is high and includes cassiope, clubmoss, and grass species.

Project Area Timber Distribution

Western hemlock dominates productive, upland timber stands throughout the CPOW Project Area, comprising an average of 65 percent of timber volume. Sitka spruce makes up about 25 percent of the volume in such stands, but predominates in many riparian zones. Cedar species (yellowcedar and western redcedar) make up most of the remaining 10 percent. Red alder may also be present, particularly in areas disturbed by landslides, river actions, or old logging sites and roads.

Mountain hemlock and shore pine are common on poorer sites limited by drainage (both) or temperature (mountain hemlock). Historically, they have not provided a major portion of harvested volume, but this should increase as poorer sites are scheduled for logging.

Forest Classification

There are approximately 321,866 acres of land within the CPOW Project Area. Depending on the land ownership and vegetative cover, this land has been categorized as forest land, nonforest land, or other ownership.

Other Ownership

Other ownership refers to lands owned by private individuals, by the State of Alaska, or by Alaskan Native corporations. For the purposes of this document, it also includes lands which have been selected but not conveyed to the State or to Native corporations (see Land Status section of this chapter). About eight percent (25,491 acres) of the land in the CPOW Project Area is in other ownership.

Nonforested

Nonforested means National Forest land that is biologically unable to support a cover of predominantly timbered vegetation. This includes muskeg, rock out-croppings, talus slopes, and water bodies, among others. About four percent (14,322 acres) of CPOW falls into this category.

Forested

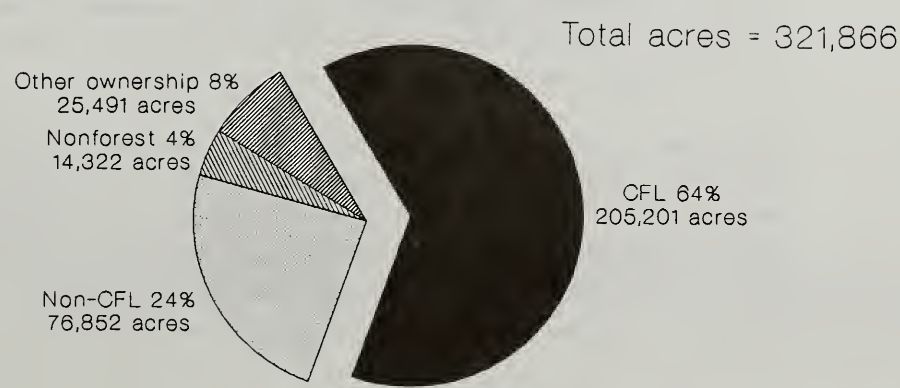
Forested land refers to National Forest land that consists largely of timbered vegetation; it is further categorized as noncommercial or commercial forest land (CFL).

Noncommercial forest land. Noncommercial forest means forested land that doesn't support enough timber volume to meet the criteria for CFL. The CPOW Project Area contains about 24 percent (76,852 acres) of noncommercial forest land.

Commercial forest land (CFL). Commercial forest land means land that is capable of producing continuous crops of timber. The Forest Service has specified that each acre of commercial forest land must be capable of producing 20 cubic feet of tree growth annually or must contain at least eight thousand board feet (MBF) of net timber volume (USDA Forest Service 1978). Old-growth and second-growth stands (younger, even-aged stands that grew after the previous stand was harvested or destroyed by agents such as wind, fire, or insects) may qualify as CFL. The CPOW Project Area contains about 64 percent (205,201 acres) of CFL.

Figure 3-11 shows the breakdown of the various Forest Classifications within the CPOW Project Area.

Figure 3-11
Forest Classifications



Commercial Forest Land

Commercial forest land may be further subdivided into three categories: unavailable for harvest, previously harvested, and sawtimber available for timber harvest. Figure 3-12 shows this breakdown.

Figure 3-12
Components of CFL

Unavailable for harvest. These lands have been withdrawn from the timber base and include: LUD I, lands associated with Primitive Recreation standards and guidelines of the TLMP Draft Revision (1991a) (see Chapter 1), buffers mandated by the Tongass Timber Reform Act on certain fish-bearing streams, minimum 100-foot buffers around all lakes greater than 10 acres in size, 500-foot buffers around the saltwater shoreline, 1,000-foot buffers around estuaries, and 330-foot buffers around all known eagle nests. Approximately 6 percent of the CFL (12,415 acres) within the Project Area is reserved from timber harvest.

Previously harvested. Previous harvests within the CPOW Project Area have largely used clearcut logging methods. The first extensive timber harvests within the CPOW Project Area did not occur until the inception of the Long-Term Sale Contract in the 1950's. Because the typical rotation age is approximately 100 years, the previously harvested stands are almost exclusively unavailable for timber harvest during this planning period. However, some of the earlier stands harvested were on the more productive sites, and may be available for harvest sooner than the typical 100-year rotation. Approximately 40 percent of the CFL (81,709 acres) within the CPOW Project Area has been previously harvested. Regeneration of harvested stands usually occurs naturally within three growing seasons following logging. Regenerated stands typically are dense and rapidly growing. These stands will be managed to provide future wood fiber.

Sawtimber available for harvest. The remainder of the CFL is sawtimber available for harvest and includes approximately 111,077 acres. This category represents those lands that have both the biological capability and availability to produce industrial wood products. They are derived from the productive, nonwithdrawn segment of the CFL. To be considered available, the forested land must:

- not be developed for nonforest uses;
- be capable of harvest with available technology to ensure timber production without irreversible resource damage to soil productivity or watershed conditions; and
- be capable of restocking within five years after final harvest.

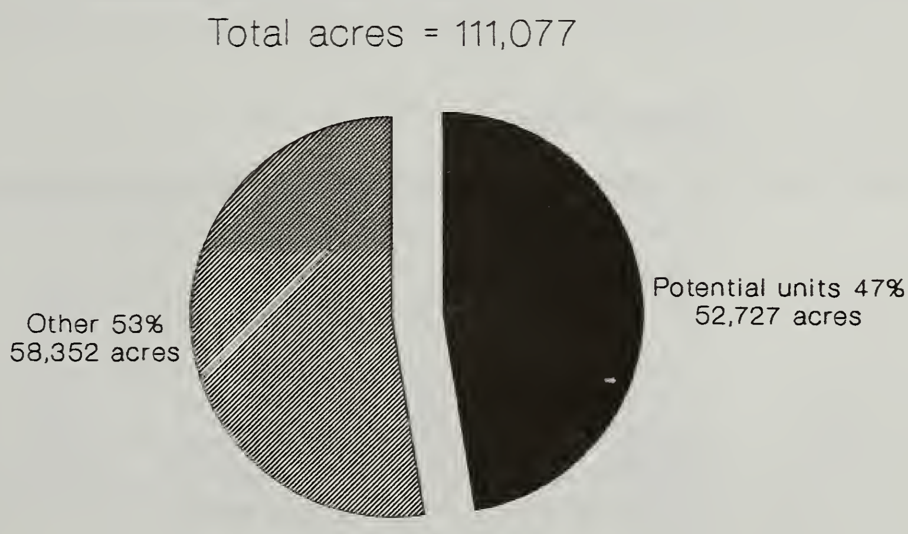
For the purposes of this analysis, to be considered available for harvest, the forested land must also:

- have sufficient timber volume to qualify within Volume Class 4–7;
- have a Land Use Designation (LUD) that allows commercial timber harvest (LUD III or LUD IV); and
- be suitable-available based on TLMP Draft Revision Alternative P (1991a)

Sawtimber Available for Harvest

In 1992 the Forest Service completed a multi-entry logging plan (MELP) which identified site-specific timber harvest units and supporting road networks for all the CFL within the CPOW Project Area. This MELP provided the framework to distinguish between lands which could support timber harvest operations using available technology (potential units) and those which apparently could not (other). Approximately 47 percent (52,727 acres) of the sawtimber available for harvest is comprised of potential units, while 53 percent (58,352 acres) is classified as other. All the harvest for the CPOW project is proposed to come from the potential units identified in the 1991-92 MELP. Figure 3-13 shows this breakdown for the CPOW Project Area.

Figure 3-13
Components of Sawtimber Available for Harvest

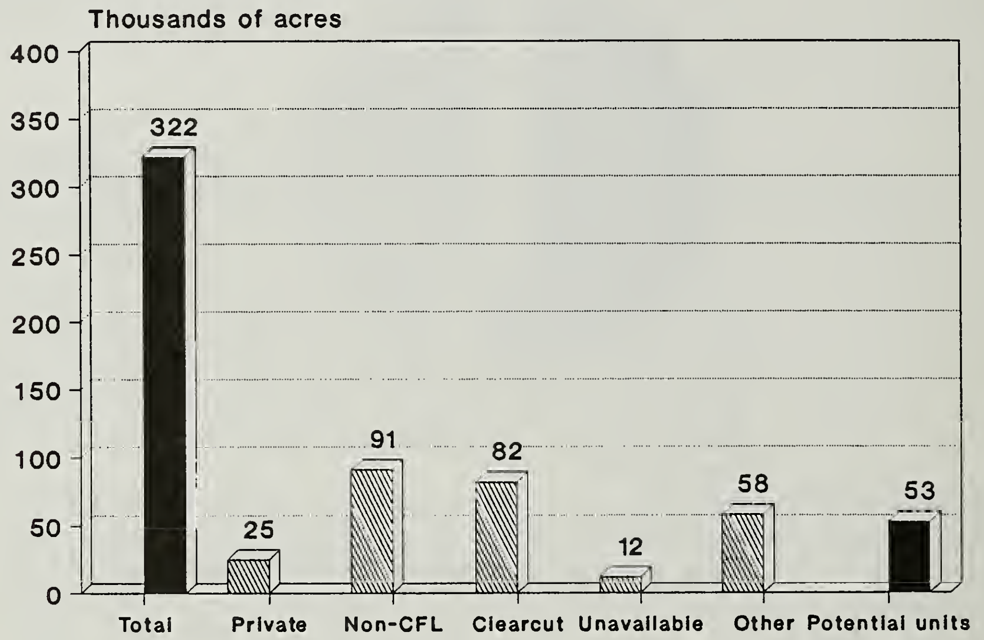


These "other" lands were defined during the interdisciplinary site-specific unit design, when some land was deferred from consideration for potential harvest units. Reasons these lands were dismissed from consideration are: unstable soils and oversteepened

slopes (60 percent), poor probability for regeneration (28 percent), very low volume per acre (7 percent), non-viable economics due to isolation (1 percent), not suitable for harvest because of TTRA or AMHU buffers (2 percent), and too small to form a logical harvest unit (Nightingale, Tongass National Forest, pers. comm.).

Figure 3-14 summarizes the classifications of the land base within thl CPOW Project Area and shows how the land identified for consideration for timber harvest was identified.

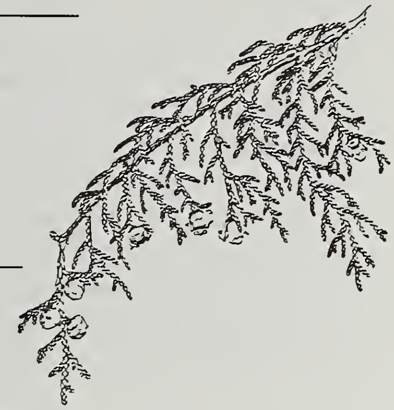
Figure 3-14
Summary of Land Classification



Volume Classes

Commercial forest land in the Tongass National Forest has been classified into volume classes. In the 1970's, the Forest Service contracted an independent consulting firm to assign volume per acre for all commercial forest land on the Ketchikan Administrative Area based upon extensive aerial photo interpretation, but little fieldwork. This volume-per-acre data was stratified into volume classes, which were designed to represent a range of net sawlog timber volumes per acre. Volume Class 3 is CFL which contains less than eight MBF per acre; examples include unstocked, recently harvested stands and fully stocked, immature stands. Volume classes 4 through 7 contain trees of merchantable size and with more than eight MBF per acre. Table 3-24 displays the volume range for each volume class.

Table 3-24
Timber Volume Range Within Volume Classes



Volume Class	Range of net sawlog volume (MBF/Acre)
4	8 - 20
5	20 - 30
6	30 - 50
7	over 50

The 1989-94 Long-Term Contract EIS (LTS EIS) used silvicultural stand examination information based on 11,714 plots to develop the average volume per acre, by volume class, for each of the three generalized areas which made up the Project Area for that EIS. These three general areas included: 1) Polk Inlet–12 Mile Arm (VCU's 600 and greater), 2) Thorne Bay–Naukati–Coffman Cove (VCU's 552 - 599), and 3) Whale Pass–Labouchere Bay (VCU's 527 - 551). This stand exam data was composed of on-the-ground evaluations of stand characteristics and capabilities; it was incorporated into the Administrative Record for the 1989-94 LTS EIS as items #73 - 75 Stand Exam Information.

These stand exam plots were randomly distributed based on individual stand characteristics, and were neither based on nor concentrated within predefined boundaries for harvest units proposed by the 1989-94 LTS EIS. Consequently, this stand exam data is relevant for the CPOW analysis and is a reasonable predictor of volume per acre by volume class. Table 3-25 displays the net volume per acre (including an estimation of utility volume) by volume class and VCU.

Table 3-25
Estimated Average Net Volume Per Acre (Including Utility), by Volume Class (VC)

VCU Range	VC 4	VC 5 (MBF/acre)	VC 6	VC 7
527 - 551	20.0	29.7	35.5	44.4
552 - 599	21.9	32.8	38.1	50.8
600 and over	26.1	30.6	43.1	58.4

These volume-per-acre figures are used to calculate planned harvest unit volumes from planned acres. Table 3-26 shows the volume class breakdown of the sawtimber available for harvest and an estimate of harvestable volume within the CPOW Project Area by volume class and VCU.

Table 3-26
Sawtimber Available for Harvest, by Volume Class (VC)

VCU	VC 4	VC 5	VC 6	VC 7	Total Acres	Estimated Volume
549.2	631	411	75	0	1,187	27,503
550	397	780	370	0	1,622	44,258
551	525	160	0	0	728	15,261
552	2,037	796	216	9	3,102	79,359
553	1,154	346	33	0	1,586	37,827
554.2	301	279	272	284	1,185	40,519
557	65	212	324	23	644	21,873
571	796	697	350	847	2,803	96,048
572	341	340	175	116	1,101	31,165
573	1,397	2,804	1,227	125	5,850	175,550
574	609	914	314	170	2,204	63,883
577	686	1,128	293	109	2,314	68,659
579	633	541	114	0	1,379	35,930
580	556	1,048	578	21	2,254	69,589
581	365	1,442	489	36	2,464	75,698
582	191	322	126	200	909	29,695
583	683	1,066	418	85	2,355	70,126
584	1,349	1,510	335	37	3,342	93,655
585	732	393	26	0	1,252	29,895
586	79	143	41	47	320	10,366
587.1	411	314	111	46	938	25,853
588	1,272	2,475	1,084	260	5,373	163,476
589	1,141	1,811	39	19	3,179	86,789
590	261	759	540	0	1,603	51,145
593	24	80	0	0	110	3,148
598	903	527	388	17	2,024	52,577
599	280	459	91	0	899	24,636
TOTAL	17,792	21,757	8,029	2,451	52,727	1,524,483

Most of the timber harvested to date within the CPOW Project Area has been from old-growth stands. Occasionally, second-growth stands originating from previous wind or landslide disturbance have been harvested. A summary of the timber acreage previously harvested to date in the CPOW Project Area is provided in Table 3-27, later in this section.

Since 1976, regeneration (the process of establishing a new crop of trees on the harvested land) has been certified by a silviculturist in the Tongass National Forest. Regeneration of a harvest unit is certified when it is adequately stocked with healthy young trees. The site is examined three years after harvest to determine if natural regeneration is progressing adequately or if artificial regeneration is required to restock the site. All sites are certified as restocked by the fifth growing season after harvest as required under NFMA, or additional regeneration activities must be scheduled.

In the Alaska Region this adequate stocking level is considered to be at least 300 trees per acre. To be considered having met the NFMA dispersion requirement (i.e., having progressed from the clearcut opening to fully established stand), the stand must be adequately stocked with healthy trees of a commercial species, with the average tree height being at least five feet. In addition, at least 60 percent of the stand must meet these minimum conditions. This new stand of trees usually regenerates by natural seeding, and will normally attain a height of five feet within 5 to 10 years after harvest. For the purposes of this project, the average age to attain a five-foot height is considered to be 8 years, with 3 years estimated for establishment of the seedlings and one foot of leader growth per year. Additional time may be required for the second growth to meet the size and stocking requirement necessary to achieve other resource objectives, such as visual quality objectives.

In the CPOW Project Area, there has been extensive precommercial thinning of regenerated stands by selectively removing trees. This thinning operation is usually scheduled when the new stand is 15–25 years old and reduces competition among trees in the stand, causing the remaining trees to increase in diameter faster than under unthinned conditions.

Effects of the Alternatives

Direct and Indirect Effects

MELP, and Design Criteria

As mentioned earlier, in 1992 the Forest Service completed a multi-entry layout plan (MELP) for the CPOW Project Area which tentatively identifed all potential harvest units and associated roads in the CFL. In April 1992, the IDT expanded the MELP to include harvest and transportation design for areas excluded from the original MELP. These additional areas included previously mapped old growth and extended rotation areas designated by the 1989-94 LTS EIS which lay either within the large, unfragmented blocks of old-growth forest within Honker Divide and Staney Creek or else within the Scenic Viewshed areas designated by the TLMP Draft Revision. This expanded 1991-92 MELP forms the basis for units to be considered for this project, as well as for future timber harvest entries.

Prior to development of this MELP, design criteria were developed by the Interdisciplinary Team (Appendix C). These design criteria were developed to minimize potential impacts to all resources and were adhered to during preliminary harvest unit and road location, evaluation and selection of proposed harvest units and roads, and final harvest unit and road design. Following are discussions of the acres of forested land harvested, the effects of silvicultural systems and timber harvest methods on the long-term productivity, and timber economic considerations. Also included is a discussion of Volume Class 6 and 7 proposed for harvest by alternative. The effects of timber harvest on mature and over-mature stands are considered long term and are discussed later in this section.

Timber Harvested

Tables 3-27 through 3-32 show the acres proposed for harvest, by VCU, in each action alternative. Also shown in these tables are total percentages of available sawtimber, commercial forest land (CFL), and overall land area harvested by the end of this

project. All units proposed for harvest have been determined to be suitable and operable (FSH 1909.12).

Alternative 3 proposes to harvest the highest number of acres (10,700 acres), followed by Alternative 2 (10,318 acres), Alternative 5 (10,128 acres), and Alternative 4 (9,557 acres). Alternative 1a proposes cancellation of 994 acres of harvest for the Long-Term Contract, as well as 25 acres of independent harvest; it proposes no new harvest. Alternative 1 proposes no new harvest and thus would not increase the number of acres harvested. In the action alternatives, 61–69 percent of all sawtimber available for harvest will have been harvested during the first 42 years of the Long-Term Contract with KPC. This cumulative harvest for the same time period is 40–45 percent of the available CFL, and 31–32 percent of the total land base within the Project Area.

Table 3-27
Acres of Forested Land Harvested for Alternative 1, by VCU

VCU	Past Harvest (Acres)	Proposed Harvest (Acres)	Total 1996 Harvest (Acres)	1996 Percent Harvested Potential Units*	CFL	Total Area
549	1,276	0	1,276	52	35	18
550	3,972	0	3,972	71	55	37
551	161	0	161	18	9	3
552	1,378	0	1,378	31	22	17
553	37	0	37	2	1	1
554	2,580	0	2,580	69	44	29
557	2,279	0	2,279	78	76	71
571	4,700	0	4,700	63	43	28
572	1,716	0	1,716	61	44	23
573	4,113	0	4,113	41	23	16
574	4,062	0	4,062	65	38	30
577	4,510	0	4,510	66	45	33
579	3,732	0	3,732	73	56	35
580	2,409	0	2,409	52	26	16
581	6,539	0	6,539	73	49	33
582	99	0	99	10	4	2
583	3,702	0	3,702	61	44	30
584	4,050	0	4,050	55	42	30
585	4,520	0	4,520	78	61	43
586	2,839	0	2,839	90	50	19
587	2,850	0	2,850	75	41	36
588	10,391	0	10,391	66	51	39
589	3,467	0	3,467	52	27	17
590	3,663	0	3,663	70	39	27
593	0	0	0	NA	NA	NA
598	2,651	0	2,651	55	32	21
599	0	0	0	NA	NA	NA
600	10	0	10	NA	NA	NA
Total	81,709	0	81,709	61	40	25

*Includes potential units plus past harvest.

Table 3-28
Acres of Forested Land Harvested for Alternative 1a, by VCU

VCU	Past Harvest (Acres)	Proposed Harvest (Acres)	Total 1996 Harvest (Acres)	1996 Percent Harvested Potential Units*	CFL	Total Area
549	1,276	0	1,276	52	35	18
550	3,972	0	3,972	71	55	37
551	161	0	161	18	9	3
552	1,378	0	1,378	31	22	17
553	37	0	37	2	1	1
554	2,580	0	2,580	69	44	29
557	2,279	0	2,279	78	76	71
571	4,700	0	4,700	63	43	28
572	1,716	0	1,716	61	44	23
573	4,113	0	4,113	41	23	16
574	4,062	0	4,062	65	38	30
577	4,510	0	4,510	66	45	33
579	3,732	0	3,732	73	56	35
580	2,409	0	2,409	52	26	16
581	6,539	0	6,539	73	49	33
582	99	0	99	10	4	2
583	3,499	0	3,499	58	42	28
584	3,588	0	3,588	49	37	27
585	4,520	0	4,520	78	61	43
586	2,839	0	2,839	90	50	19
587	2,850	0	2,850	75	41	36
588	10,391	0	10,391	66	51	39
589	3,391	0	3,391	51	26	16
590	3,410	0	3,410	65	36	25
593	0	0	0	NA	NA	NA
598	2,626	0	2,626	54	32	21
599	0	0	0	NA	NA	NA
600	10	0	10	NA	NA	NA
Total	80,690	0	80,690	60	40	25

*Includes potential units plus past harvest.

Table 3-29
Acres of Forested Land Harvested for Alternative 2, by VCU

VCU	Past Harvest (Acres)	Proposed Harvest (Acres)	Total 1996 Harvest (Acres)	1996 Percent Harvested Potential Units*	CFL	Total Area
549	1,276	0	1,276	52	35	18
550	3,972	422	4,394	78	61	41
551	161	30	191	21	10	4
552	1,378	0	1,378	31	22	17
553	37	347	384	24	12	5
554	2,580	207	2,787	74	50	35
557	2,279	153	2,432	83	82	76
571	4,700	845	5,545	74	51	37
572	1,716	197	1,913	68	50	32
573	4,113	559	4,672	47	26	18
574	4,062	102	4,164	66	39	31
577	4,510	310	4,820	71	48	35
579	3,732	585	4,317	84	65	40
580	2,409	554	2,963	64	31	19
581	6,539	312	6,851	76	52	34
582	99	213	312	31	13	6
583	3,702	473	4,175	69	50	36
584	4,050	753	4,803	65	50	34
585	4,520	281	4,801	83	65	46
586	2,839	61	2,900	92	51	43
587	2,850	263	3,113	82	45	40
588	10,391	1,820	12,211	77	60	46
589	3,467	118	385	54	28	18
590	3,663	753	4,416	84	47	32
593	0	79	79	NA	NA	NA
598	2,651	511	3,162	68	38	24
599	0	370	370	NA	NA	NA
600	10	0	10	NA	NA	NA
Total	81,709	10,318	92,027	68	45	31

* Includes potential units plus past harvest.

Table 3-30
Acres of Forested Land Harvested for Alternative 3, by VCU

VCU	Past Harvest (Acres)	Proposed Harvest (Acres)	Total 1996 Harvest (Acres)	1996 Percent Harvested Potential Units*	CFL	Total Area
549	1,276	66	1,342	54	37	19
550	3,972	653	4,625	83	64	43
551	161	106	267	30	14	6
552	1,378	1,004	2,382	53	38	30
553	37	990	1,027	63	32	14
554	2,580	73	2,653	70	45	34
557	2,279	76	2,355	81	79	73
571	4,700	406	5,106	68	47	33
572	1,716	0	1,716	61	44	29
573	4,113	602	4,715	47	27	18
574	4,062	224	4,296	69	40	32
577	4,510	475	4,985	73	49	36
579	3,732	682	4,414	86	66	41
580	2,409	604	3,013	65	32	20
581	6,539	37	6,576	73	50	33
582	99	213	312	31	13	6
583	3,702	529	4,231	70	51	35
584	4,050	726	4,776	65	50	36
585	4,520	281	4,801	83	65	46
586	2,839	0	2,839	90	50	42
587	2,850	104	2,954	78	43	38
588	10,391	738	11,129	71	55	42
589	3,467	823	4,290	65	34	22
590	3,663	487	4,150	79	44	30
593	0	0	0	NA	NA	NA
598	2,651	453	3,104	66	37	25
599	0	348	348	NA	NA	NA
600	10	0	10	NA	NA	NA
Total	81,709	10,700	92,409	69	45	32

* Includes potential units plus past harvest.

Table 3-31
Acres of Forested Land Harvested for Alternative 4, by VCU

VCU	Past Harvest (Acres)	Proposed Harvest (Acres)	Total 1996 Harvest (Acres)	1996 Percent Harvested Potential Units*	CFL	Total Area
549	1,276	31	1,307	53	36	19
550	3,972	659	4,631	83	64	43
551	161	157	318	36	17	7
552	1,378	699	2,077	46	33	25
553	37	327	364	22	11	5
554	2,580	208	2,788	74	47	35
557	2,279	153	2,432	83	82	77
571	4,700	835	5,535	74	51	36
572	1,716	92	1,808	64	47	30
573	4,113	997	5,110	51	29	20
574	4,062	166	4,228	67	40	31
577	4,510	566	5,076	74	50	38
579	3,732	572	4,304	84	65	40
580	2,409	329	2,738	59	29	18
581	6,539	145	6,684	74	50	33
582	99	145	244	24	10	5
583	3,702	181	3,883	64	47	32
584	4,050	252	4,302	58	45	32
585	4,520	331	4,851	84	65	46
586	2,839	61	2,900	92	51	43
587	2,850	196	3,046	80	44	39
588	10,391	1,317	11,708	74	58	44
589	3,467	328	3,795	57	30	19
590	3,663	120	3,783	72	40	27
593	0	79	79	NA	NA	NA
598	2,651	172	2,823	60	34	22
599	0	439	439	NA	NA	NA
600	10	0	10	NA	NA	NA
Total	81,709	9,557	91,266	68	44	31

* Includes potential units plus past harvest.

Table 3-32
Acres of Forested Land Harvested for Alternative 5, by VCU

VCU	Past Harvest (Acres)	Proposed Harvest (Acres)	Total 1996 Harvest (Acres)	1996 Percent Harvested Potential Units*	CFL	Total Area
549	1,276	117	1,393	57	38	20
550	3,972	502	4,474	80	62	42
551	161	30	191	21	10	4
552	1,378	0	1,378	31	22	17
553	37	0	37	2	1	0
554	2,580	275	2,855	76	48	37
557	2,279	153	2,432	83	82	80
571	4,700	754	5,454	73	50	35
572	1,716	167	1,883	67	49	32
573	4,113	383	4,496	45	25	17
574	4,062	28	4,090	65	38	30
577	4,510	369	4,879	71	48	36
579	3,732	617	4,349	85	65	41
580	2,409	618	3,027	65	32	20
581	6,539	224	6,763	75	51	34
582	99	0	99	10	4	2
583	3,702	465	4,167	69	50	34
584	4,050	475	4,525	61	47	34
585	4,520	281	4,801	83	65	46
586	2,839	61	2,900	92	51	43
587	2,850	381	3,231	85	47	41
588	10,391	1,945	12,336	78	61	46
589	3,467	312	3,779	57	30	19
590	3,663	672	4,335	82	46	31
593	0	79	79	NA	NA	NA
598	2,651	775	3,426	73	41	27
599	0	445	445	NA	NA	NA
600	10	0	10	NA	NA	NA
Total	81,709	10,128	91,837	68	45	31

* Includes potential units plus past harvest.

Harvest by Plant Series

Timber harvest activities would affect forested plant communities but would have little or no effect on nonforest plant communities, with the exception of short road segments which may cross nonforested areas. The short-term effect on vegetation in the CPOW Project Area resulting from timber harvest would be the conversion of old-growth climax forest types to younger, faster-growing successional stands. This will result in a long-term increase in the production of total wood fiber. The removal of the forest overstory would change the microsite conditions that had influenced the species composition and density of the understory vegetation. Species that thrive best in the shaded and protected environment under the mature forest (such as mosses, lichens, herbs, and shrubs) would find themselves without the beneficial influence of the trees and be reduced in vigor or competitive ability. Some species survive in the understory, but when released from the influence of the mature overstory become vigorous competitors for growth space; these species include salmonberry, huckleberry and western hemlock. Other species that don't thrive in the shaded conditions under the mature forest canopy (notably Sitka spruce, Western redcedar, and yellowcedar), do well in open, full sunlight conditions. Table 3-33 shows the acres of proposed harvest for each major plant series found within the CPOW Project Area by alternative.

Table 3-33
Acres of Proposed Harvest by Major Plant Series, by Alternative

Alternative	Western Hemlock	Sitka Spruce	Mixed Conifer	Cedar*	Total
1	0	0	0	0	0
2	7,413	207	2,454	244	10,318
3	7,470	113	2,708	409	10,700
4	7,083	166	1,975	333	9,557
5	7,608	166	2,157	197	10,128

* Refers to Western Hemlock-Western Redcedar Series.

Western hemlock is the most widely harvested plant series in all action alternatives, ranging in harvest from 7,083 acres to 7,608 acres. The successional changes which occur in the forest after harvest are described in a later section.

Silvicultural Systems

Both even- and uneven-aged management are approved for use in the CPOW Project Area, depending on specific resource needs (Forest Service 1983). The unit cards in Appendix D provide the diagnostic silvicultural prescription; they will be updated for the Final EIS. Clearcutting, an even-aged silvicultural system, is recommended as the basic silvicultural system for hemlock-spruce forests. It leads to adequate natural regeneration, is economical, and is appropriate for old-growth stands with large, defective timber. Clearcutting allows more sunlight to reach the forest floor, which increases the decomposition of heavy organic accumulations and the recycling of nutrients. Clearcutting disturbs less area for a given amount of timber harvested than does partial cutting. For example, for a project the size of CPOW, the volume of 290 MMBF associated with the stated purpose and need of the project could be harvested

from approximately 10,000 acres by clearcut logging, but would require approximately 20,000–30,000 acres to yield the same volume if partial cutting were employed.

Clearcutting is the most effective means of eliminating dwarf-mistletoe (a disease which causes growth loss and is common to hemlock/spruce forests). Partial cutting could allow mistletoe-diseased standing trees to infect the newly regenerated stand. Clearcutting also tends to provide a higher percentage of Sitka spruce regeneration, because spruce regenerates better in full sunlight than other Southeast Alaska species (Harris and Farr 1974). This is desirable because Sitka spruce is an economically preferred species. Also, where shallow-rooted tree species, shallow soils, and exposure to the effects of severe weather conditions contribute to windthrow, clearcutting is an effective silvicultural system. These factors are common in the CPOW Project Area. Based on these reasons, clearcutting is considered the optimal method to harvest standing timber in the CPOW Project Area.

The CPOW Interdisciplinary Team identified harvest units that are potentially more suitable for partial removal of the timber than for clearcut harvest, in order to achieve other resource objectives. These partial cut harvest units will utilize a form of group selection and will be used to meet specific visual quality objectives. These partial cut units are limited to helicopter yarding or to short span uphill cable logging, where logs can be controlled during yarding to minimize damage to residual stands. Based on experience, logging costs for partial cutting typically run 20 to 50 percent higher than costs for clearcutting. However, by using this silvicultural system, harvest units may be partially harvested which would otherwise be unacceptable for clearcutting because of other resource concerns. In addition, partial cuts may be used to enhance other resources such as wildlife. The following units are prescribed for partial cutting.

Unit	Alternatives
574-228	3
574-239	3

There are also some units prescribed for shelterwood harvest, as discussed under Regeneration, later in this section. These partial cut units will allow evaluation of the success of alternate silvicultural systems, addressing the recent directive from the Chief of the Forest Service to reduce the national use of clearcutting and to restrict its use to situations where it provides the optimal silvicultural treatment. The total harvest by silvicultural system is shown in Figures 2-2 and 2-3, in Chapter 2.

Proposed Harvest Methods

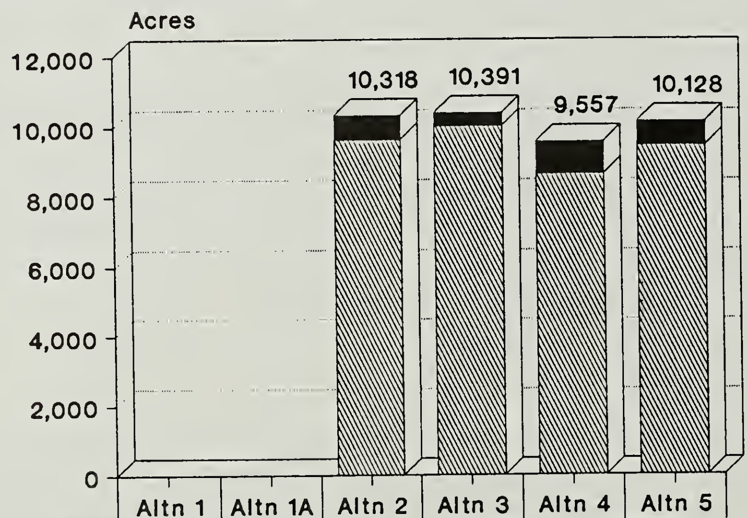
Yarding is the process of moving logs from the stump to a landing. This can be done using ground-based equipment, cable logging systems, or helicopters. The method used depends upon many factors including access, topography, slope, and resource protection needs.

Moist and soft soils along with steep slopes in the CPOW Project Area are difficult for operation of ground-based equipment, and except for shovel logging with track-mounted log loaders, there has been little opportunity for use of this type of equipment. Shovel logging is a fairly new yarding system of moving logs with the boom of a hydraulic log loader. The objective is to use the swing boom of the loader to place logs into windrows, then successively move the windrows closer to a road or landing.

The major impact associated with shovel logging results from the track system of the log loader compacting the soil. The degree of soil compaction is influenced by soil type and the prevailing moisture conditions. Shovel logging is the most problemmatic on poorly drained soils with parent organic material. Much of the impact on soil compaction can be eliminated when the loader is operating on slash or deep organic accumulations. In many instances, shovel logging will have less impact on the soil than conventional highlead logging, because that yarding system is unable to achieve front end lift and gouges the log into the ground.

Because shovel yarding is usually limited to slopes of less than 20 percent, portions of proposed units may be potentially suited for shovel logging but are tentatively planned for cable logging until harvest unit layout makes the final determination possible. All units proposed for harvest for the alternatives considered in this Draft EIS have been designated for cable or helicopter yarding. However, the planning process has identifed areas where shovel logging may be appropriate. Figure 3-15 shows these acres of shovel yarding potential.

Figure 3-15
Acres of Shovel Yarding Potential



	Altn 1	Altn 1A	Altn 2	Altn 3	Altn 4	Altn 5
Shovel yarding	0	0	692	383	27	681
Other harvest	0	0	9,626	10,008	8,630	9,447

Helicopter yarding is relatively new to the Ketchikan Area. Logs are lifted off the ground and flown to landings, up to a mile from the harvest unit. In most cases there will be no new road construction associated with helicopter yarding. This yarding system causes the least amount of impact to the soil but has the highest yarding cost. Because of its expense, helicopter yarding is usually restricted to areas where it is extremely difficult or expensive to construct roads or where the associated impacts of convential cable yarding systems would violate Forest Service standards and guidelines. Helicopter yarding is proposed to play a major role in all alternatives, except for Alternative 4.

Highlead and small skyline systems (rigged live or running) account for the majority of the timber harvest in each alternative. Highlead logging, while a relatively inexpensive logging system, provides the least opportunity for suspension or lateral control of the logs while enroute to the landing. Small skyline systems can provide log suspension and, when rigged with a slack-pulling carriage, lateral yarding capabilities.

Slackline systems are employed where a larger tower is needed to achieve log suspension requirements and to provide greater lateral yarding capability. Generally, these larger towers (90–110 feet) require larger landing sizes, greater tailhold and guy anchor strength, and, in some cases, wider turn radius on the roads. Within the CPOW Project Area, adequate tailhold strength frequently limits the use of slackline yarding.

Table 3-34 displays the distribution of proposed yarding systems for the action alternatives. Because Alternatives 1 and 1a propose no timber harvest and no acres would be cut, they are not displayed.

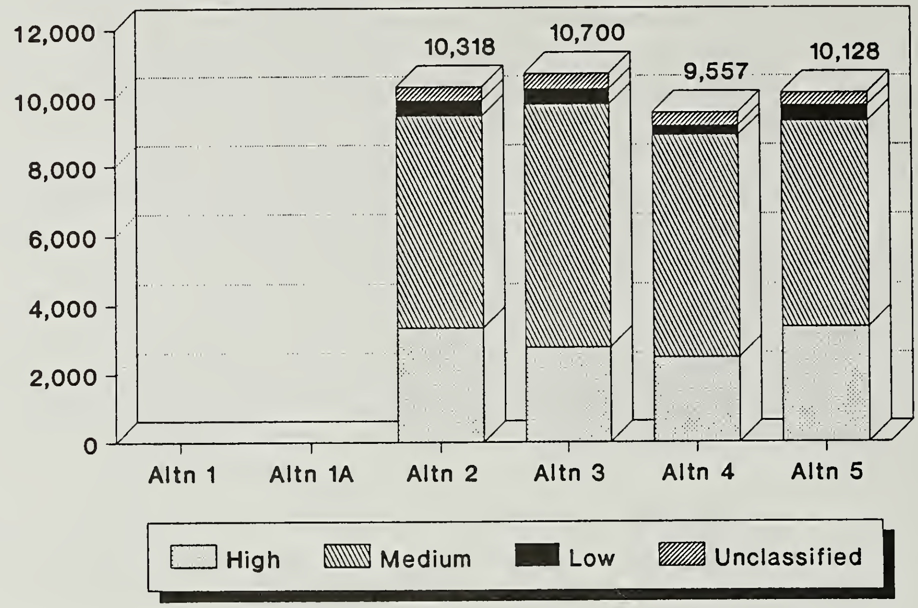
Table 3-34
Distribution of Proposed Harvest System, by Alternative, in MMBF

Alternative	Highlead	Small Skyline	Slackline	Helicopter
2	113	85	13	89
3	111	93	13	78
4	142	119	17	0
5	110	92	18	76

Proposed Harvest by Site Class

Because some sites are more productive than others, they are rated by a site index and assigned a site class of low, medium, or high. The site index is based on the expected height to which a tree will grow on that site within a given number of years (in this case, 100 years). On low sites, trees would be expected to grow between 50 to 69 feet in 100 years. On medium sites, trees would be expected to grow between 70 to 89 feet in 100 years, and on high sites trees would achieve a height greater than 90 feet in 100 years. In general, more timber can be grown at less cost on a high site than on a medium or low site. Because logging costs also tend to be less for the more productive sites, the economic implication is to concentrate timber harvest on the stands with high site indices. However, by harvesting a mixture of site classes, average timber management and logging costs can be developed which allow economically viable harvest of the less productive sites. This harvest mixture allows more low site class land to be managed for timber production. Figure 3-16 shows the acres of proposed harvest by site class and by alternative.

Figure 3-16
Acres of Proposed Harvest by Site Class



In all action alternatives, the majority of the harvest (58–67 percent) is proposed to come from sites of medium productivity. Highly productive sites account for 26–33 percent of the proposed harvest, while sites of low productivity and currently unclassified sites make up the rest of the harvest.

Proportion of Volume Class 6 and 7 Proposed for Harvest

The Tongass Timber Reform Act of 1990 modified the Long-Term Contract to:

> "Eliminate the practice of harvesting a disproportionate amount of old-growth timber by limiting the volume harvested over the rotation in Volume Classes 6 and 7, as defined in TLMP and supporting documents, so that the proportion of volume harvested in these classes within a contiguous management area does not exceed the proportion of volume currently represented by these classes within the management area."

Forest Service Handbook 2409.18, Supplement 92-5, contains the procedure to follow for calculating proportionality. The baseline for proportionality was established with the signing of TTRA into law (November 1990). Volume class determination for proportionality is based on net sawlog inventory volume class, as determined from the Ketchikan Area's GIS timber type map, per Forest Service Handbook direction. It is important to note that the TTRA proportionality requirement is based upon volume actually harvested, as opposed to volume scheduled or planned for harvest. Consequently the measure of compliance will occur after the timber harvest for a given management area is actually completed and based upon the timber type map.

For the purpose of this analysis, proportionality calculations considered all long-term harvest which occurred from the TTRA date (11-90) until the date the data base was frozen (01-92) plus all harvest proposed for this project.

Table 3-35 displays the proportionality for all action alternatives for all the management areas (MA's) within the CPOW Project Area. Since Alternatives 1 and 1a propose no additional timber harvest at this time, they are not displayed as there would be no change in proportionality.

Table 3-35
Proportionality Table

MA	Acres VC 4-5	Acres VC 6-7	Before %	After %	Diff.*
Alt. 2					
K03	349	79	0.1895	0.1895	0.000
K07	2,624	1,227	0.3182	0.3180	0.000
K08	1,348	104	0.2148	0.2178	-0.003
K09	2,804	382	0.1906	0.1964	-0.006
K10	801	46	0.2108	0.2167	-0.006
Alt. 3					
K03	583	180	0.1895	0.1887	0.001
K07	2,000	556	0.3182	0.3227	-0.005
K08	2,936	297	0.2148	0.2209	-0.006
K09	2,655	283	0.1906	0.1977	-0.007
K10	677	43	0.2108	0.2155	-0.005
Alt. 4					
K03	597	217	0.1895	0.1882	0.001
K07	1,858	1,056	0.3182	0.3157	0.003
K08	2,441	383	0.2148	0.2181	-0.003
K09	1,679	273	0.1906	0.1930	-0.002
K10	617	16	0.2108	0.2159	-0.005
Alt. 5					
K03	503	122	0.1895	0.1894	0.000
K07	2,838	1,300	0.3182	0.3183	0.000
K08	896	111	0.2148	0.2161	-0.001
K09	2,458	222	0.1906	0.1979	-0.007
K10	1,045	137	0.2108	0.2157	-0.005

* "-" indicates a higher proportion of volume class 6 and 7 is projected to be remaining after the alternative than was in the management area prior to the project. All management areas in all alternatives are projected to meet the requirements of TTRA.

Alternatives 1, 1a, 2, and 5 are projected to result in proportionality consistent with the requirements of the TTRA for all management areas (MA) proposed for activity in this analysis. In addition, Alternatives 3 and 4 are projected to result in proportionality consistent with the requirements of the TTRA for MA's K08, K09, and K10. Alternatives 3 and 4 are projected to result in a proportionality which would not meet current proportionality at the time the proposed activity is completed for MA's K03 (both Alt. 3 and 4) and K07 (Alt. 4 only). However, Alternatives 3 and 4 could still be considered viable in terms of compliance with the proportionality provisions of the TTRA provided the analysis required in FSH 2409.18, Supplement 92-5, is done. This analysis was done, and shows that there is sufficient timber base available for one or more additional entries prior to the end of the rotation. This analysis concludes that opportunities exist for achieving proportionality under the terms of

the Long-Term Contract prior to its scheduled expiration in 2004. This analysis also concludes that the potential future offering would be economical based upon mid-market values and costs as of the NEPA start date for this analysis (09-07-91, the date the Notice of Intent was filed). The next entry would propose to harvest a total of approximately 10,000 acres, 2,000 of which would be classified as Volume Class 6 or 7 by the GIS area timber type map. The projected proportionality after this next entry would be .1895 for MA K03 and .3182 for K07.

Size of Harvest Units

The National Forest Management Act of 1976 (NFMA) specifies a limit on the size of created forest openings that may be created, based on the forest type. For the western hemlock/Sitka spruce forest type associated with Southeast Alaska, this maximum opening size is 100 acres. The NFMA provides flexibility to exceed this opening size in situations where larger units will produce a more desirable contribution of benefits. Factors as specified in the NFMA and the Alaska Regional Guide provide for the following exceptions:

1. Topography.
2. Spatial relationship of unit to other natural or artificial opening and proximity of units.
3. Coordination and consistency with adjacent management areas.
4. Effect on water quality and quantity.
5. Visual absorption capacity.
6. Effect on wildlife and fish habitat.
7. Regeneration requirements for desirable tree species, based on latest research.
8. Transportation and harvesting system requirements.
9. Natural and biological hazards to the survival of residual trees and surrounding stands.
10. Relative total costs of preparation, logging, and administration of harvest cuts.

Where it is determined by the IDT that exceptions to the size limitation are warranted, the actual size limitation of openings may be up to 100 percent greater (200 acres) for factor 9, and up to 50 percent greater (150 acres) for all other factors, with the approval of the Forest Supervisor. Exceptions to the 100-acre size limit in excess of 50–100 percent greater are permitted on an individual timber sale basis after 60 days public notice, and review and approval by the Regional Forester.

Each of the action alternatives proposes harvest units or combinations thereof which are currently planned to exceed 100 acres. More precise estimation of the unit size and configuration will be determined as field reconnaissance proceeds (between the Draft EIS and the Final EIS), as well as during actual harvest unit layout. Table 3-36 shows the units proposed by each alternative which exceed 100 acres. In all cases the reasons for exceeding the size limits are factors 1, 8, or 10.

Table 3-36
Harvest Units Exceeding 100 Acres, by Alternative

Harvest units	Opening size	Alternatives proposed
550-214,550-239	115	2,3,4
550-230	104	3,4,5
551-249,551-250	110	4
552-201,552-202	115	3,4
552-203,552-204,552-206,552-215	120	3
552-212,552-219	148	3
552-258,552-259,573-270	125	3
571-227	123	2
571-226,571-227	174	4
571-267,571-268	110	2, 4,5
573-203,573-274,573-275	127	4
573-314	110	4
574-247,574-248	122	2, 5
579-208,579-209	133	2,3,4,5
579-215,579-216,579-219	115	4,5
580-212,580-213	149	2,3, 5
580-218,580-219	108	2,3, 5
580-221,580-239	114	2,3, 5
580-227,580-227B	119	3,4
582-214,582-215	107	2,3,4
583-215,583-216	142	2,3, 5
583-242,583-243	129	2,3
584-220,584-220B,584-263	106	2,3,4
584-250,584-251	119	2,3,4,5
584-272	140	2,3
585-201,585-202,585-203	104	2,3, 5
585-201,585-202,585-203,585-204	139	4
586-226,586-227	139	5
586-225,586-226,586-227,586-228	303	4
586-228	103	2,3
587.1-208,588-324	159	3
588-215,588-215B,588-216	102	4
588-268,588-269	115	3
588-269,588-270	136	2, 4,5
588-277,588-278	116	2
588-278,588-279	138	5
588-300,588-302	161	5
588-301,588-302	124	2
588-310,588-312	142	2 5
588-322	139	2, 4,5
588-327	117	2,3, 5
589-203,589-204,589-205	134	3
589-232,589-233	102	3,4,5
589-257	118	2, 5
589-274,589-275	126	3,4
590-210,590-211	129	2,3, 5
590-229,590-230	112	2, 5
590-243	103	2,3, 5
598-207,598-207B	152	5
598-220	122	2,3, 5

Timber Economics

Timber harvest can provide significant direct and indirect economic value to local communities, and can have a significant direct and indirect economic impact on the regional and national levels. On the local level, direct values include employment for loggers, road builders, and mill workers. The Forest Service returns 25 percent of net receipts plus purchaser credits to the state to be used for local schools and road maintenance. Within timber-based communities, fluctuations in harvest levels can substantially affect both jobs and funding for education and roads.

Current Forest Service Handbook direction (FSH 2409.18, R-10 Supp.6, 1989) for Region 10 requires the completion of a mid-market analysis to compare benefits and costs of a project. This handbook also directs that timber harvest projects provide at least 60 percent of normal profit and risk, which must be included when calculating costs. This mid-market analysis is performed by comparing expected gross revenues to estimated costs and arriving at an estimate of net revenues. In order to account for market fluctuations, weighted average timber values over the past 13 years are used in the analysis.

Pond values represent the delivered price of logs at the mill minus the cost to manufacture them into useable products. Pond values are closely related to volume class data which incorporate log size, grade, and species. On the Ketchikan Area, the lower volume classes generally have a higher yellowcedar component which has the highest selling value. Consequently, pond values are higher for the lower volume classes.

Stump-to-truck logging costs are subtracted from the pond values to arrive at a delivered price to the mill. Stump-to-truck logging costs include felling, bucking, yarding, loading, 60 percent of normal profit and risk, and administrative costs. Logging costs are closely tied to volume per acre (represented by volume class data). Generally the higher the volume per acre the lower the logging cost. Table 3-37 shows the stump-to-truck logging costs and associated pond values for each volume class, based upon first quarter 1990 data.

Table 3-37
Summary of Stump-to-Truck Logging Costs and Pond Values, by Volume Class, in MBF

Volume	High Lead		Skyline		Slack		60%	Pond
Class	Up	Down	Running	Live	Line	Helicopter	Profit/Risk	Value
4	184.68	213.75	161.80	177.25	219.25	199.52	47.58	369.25
5	154.13	176.19	140.33	149.48	182.76	191.77	47.72	332.36
6	114.95	131.50	108.84	112.43	138.39	168.71	50.16	315.47
7	88.22	100.29	86.77	87.20	106.56	156.04	50.16	310.71

In addition to logging costs, costs related to truck haul, dump, tow, raft, specified road construction and reconstruction, temporary road construction, Log Transfer Facility (LTF) construction, camp development, and camp mobilization costs need to be considered when determining the economics of timber sales. For the purposes of this analysis, haul, dump, tow, and raft costs were estimated at $35 per MBF. Because the timber associated with the CPOW project can be logged by existing logging

camps, there will be no camp development or mobilization costs. Similarly, all timber can be hauled to existing LTF's, so this cost can be eliminated. It is estimated that specified road construction will average between $144,500 to $198,100 per mile, while temporary road construction will be approximately $100,000 per mile. Specified road reconstruction is estimated to range from $12,300 per mile for normal reconstruction to $48,100 per mile for heavy reconstruction.

Estimated net timber value (stumpage) is arrived at by subtracting all associated logging and road costs from the pond value for all proposed harvest units in each action alternative. Individual units which may be uneconomical to harvest by themselves would be offset by blending them with other units which are economical to harvest. This would result in less productive lands or lands where the timber is highly defective being made economically viable for timber harvest.

It cannot be over-emphasized that these projected pond values and logging/road costs are based on the best information available at this time. Before the timber is released to KPC in individual offerings, the timber will be cruised and appraised, using current selling values and costs to determine the volume and value of the timber. Table 3-38 shows the estimated net stumpage for each alternative.

Table 3- 99
Summary of Estimated Stumpage Values, by Alternative

Alt.	Estimated Volume (MBF)	Pond Value ($/MBF)	60% Profit/Risk ($/MBF)	Logging Cost ($/MBF)	Road Cost ($/MBF)	Net Stumpage ($/MBF)
1	0	0	0	0	0	0
1a	0	0	0	0	0	0
2	299,586	336.64	48.38	196.76	55.49	36.01
3	295,190	341.29	48.18	201.11	65.23	26.77
4	278,413	336.81	48.46	184.90	68.23	35.22
5	296,693	336.28	48.38	195.53	52.69	39.68

Based on this analysis, all action alternatives show a positive net stumpage. This situation may change for the Final EIS, because logging and transportation systems may be revised as a result of the site specific recon which will take place between the Draft EIS and the Final. In addition, updated logging costs and selling values can have an undetermined effect on overall stumpage values. Alternative 5 shows the highest relative net stumpage ($39.68), while Alternative 3 shows the lowest ($26.77). Logging costs are lowest for Alternative 4 ($184.90), which matches the emphasis of that alternative. Road costs are relatively high for Alternative 4 because there is no helicopter volume.

Cumulative Effects

Plant Succession

After reforestation, managed forests grow through several distinctive successional stages which generally are applicable to all units proposed for harvest under the action alternatives. Characteristics such as height, diameter, and productivity vary according to site class (discussed previously in this section). Different components dominate the stand at different stages, and the overall forest structure changes over time.

The first 20 years following harvest is referred to as the seedling-sapling understory colonization stage. During the first 5 years of this stage, the young stand receives maximum sunlight, resulting in the rapid establishment of a variety of shrubs, forbs, and grasses. There is little incidence of damage or mortality from disease or infestation at this stage. The changed structure of the young stand affects the structure of adjacent stands. Windthrow potential of the adjacent stand increases with greater wind exposure, and understory development accelerates due to increased sunlight into the newly developing stand.

In years 5 to 20, seedlings grow into a vigorous new forest of trees, averaging about 25 feet in height and 4 inches diameter at breast height (DBH). Understory production of woody-stemmed species is at its highest at this stage, especially in blueberry-dominated sites. Larger dead materials from the original stand begin to decompose, and the stand edge stabilizes, resulting in less windthrow to the adjacent stand. At the end of this successional stage, the stand can be considered for precommercial thinnning, leaving a species composition of about 60 percent western hemlock, 40 percent Sitka spruce, and a small cedar component.

The next successional stage occurs during years 20 to 50 following harvest and is referred to as the understory exclusion stage. It is characterized by accelerated tree growth (approximately one foot per year) and a rapidly closing tree crown canopy. At age 50, tree heights average about 76 feet and diameters average about 8 inches, depending on the site class. Tree crowns begin to grow closer together, causing the understory to change from a dense shrub, herb, and seedling-dominated structure to one of dense moss. Stands which have been precommercially thinned will have a two-layered canopy with western hemlock in the lower story. Canopy closure will occur more slowly in precommercially thinned sites. As any proposed harvest would probably not begin until 1993 and is expected to be substantially complete in 1996, none of the units proposed for harvest at this time would grow into this successional stage by 2004. The only change that occurs is the growth of some of the existing harvest units into the understory exclusion stage.

In years 50 to 80, the stand remains closed. At age 80, tree heights average about 105 feet and diameters average about 12 inches, depending on site class. Little sunlight reaches the forest floor, and the understory continues to be dominated by moss. Tree diameter growth slows to about one inch every ten years, as competition between trees increases. It is not currently economically feasible to commercially thin trees at this stage, but thinning would increase growth and diversity of the shrub layer, as well as increase diameter growth of the remaining trees.

In years 80 to 100—the mature, even-aged forest and understory reinitiation stage—the stand becomes mature. At age 100, tree heights average about 120 feet and diameters average about 14 inches, depending on site class. Some trees may die, while others become clearly dominant in size. Diameter growth remains at less than 1 inch every 10 years. Moss continues to dominate the understory, except in places where the canopy has opened and allowed sufficient light for herbaceous plants. These structural

characteristcs continue into the later stages of the stand (approximately 100 to 160 years) with continued slow growth and occasional openings in the canopy (USDA Forest Service 1989).

The final successional stage for a forest is the old-growth stage, which would pertain to stands that are prescribed to be managed for old-growth conditions or stands that have been deferred for harvest. This stage is characterized by a multi-storied stand with a large over-mature overstory composed of live and dead trees and an understory of mostly shade-tolerant western hemlock. There would be a substantial component of downed large trees and occasional openings in the forest canopy. Patches of shrubs, tree saplings, and herbs alternate with patches of overmature timber, creating a complex, multilayered mosaic. The stand declines in growth and has the highest degree of variation and most structurally diverse understory of any successional stage.

Regeneration

All of the areas proposed for harvest will be restocked within five years of harvest, either by natural regeneration or by replanting. The Forest Service is required by law, regulation, and policy to plan timber harvest only where there is assurance that such land can be regenerated within five years after the harvest is completed. Current management prescriptions for the CPOW Project Area specify natural regeneration to restock most clearcut harvested stands. Artificial regeneration by hand planting would serve as the backup method for units that could not be certified as adequately stocked within five years after harvest, or for units where the silvicultural prescription calls for the planting of particular species to meet specific resource objectives.

While units that will require supplemental hand planting can't be positively identified until harvest and natural regeneration have been allowed to run their course, based on preliminary recon the following units have been identified as having potential regeneration problems. Regeneration in these units will be monitored closely:

552-215	554.2-201	579-218	580-201	580-212
584-220	584-226	584-227	584-252	585-210B
588-285	588-301	588-305	588-310	589-214
598-220	598-222			

Yellowcedar and western redcedar are less adaptable to natural regeneration following clearcut harvest. In order to maintain the cedar component of stands where they naturally occur, the Forest Service could hand plant or use an alternate silvicultural system such as leaving seed trees. CPOW has several units with a high cedar component which are planned for helicopter yarding. In this case, hand planting would be prohibitively expensive, so these units are being designed to leave all the cedar uncut, which will favor natural cedar regeneration. These units are characterized by having a high cedar component, being planned for helicopter yarding, and being either above 1,200 feet elevation on a north or east aspect or over 1,500 feet elevation on a south or west aspect. These units include:

573-249	573-251	580-200	583-242	588-283
590-201	590-210	590-219		

Site preparation for natural regeneration by broadcast burning has not been found to produce acceptable results and probably will not be used for units proposed for harvest by this project.

Precommercial Thinning

Stocking on many sites can average 4,000 stems per acre, which is far in excess of fully stocked stand conditions. Although these stands may eventually thin naturally, production of commercially useable wood would be hastened if stocking were less dense through the use of precommercial thinning (Harris and Farr 1974). The current Forest Plan estimates that for every acre precommercially thinned, timber yield increases by approximately 5.4 MBF. Because thinning allows the understory vegetation and the remaining trees to grow at accelerated rates, forage production and ultimate sawlog volume would be increased. Thinning also encourages faster successional change and more rapid conversion to climax vegetation conditions. Because precommercial thinning is typically performed when the stand reaches approximately 20 years of age and is dependent on site, stocking, and other resource needs, it is not feasible to project which proposed harvest units will benefit from precommercial thinning in the future.

Projected Future Harvest Through 2004

The harvest schedule in Appendix A calls for a second entry into the CPOW Project Area to occur in the year 1999 and at a harvest level of approximately 270 MMBF. The CPOW MELP completed in 1991-92 identifies individual harvest units within the Project Area which can be considered for harvest during the next timber entry. In order to estimate the VCU's where this future harvest will occur, the percentage of harvest units by VCU in the MELP was applied to the 270 MMBF target associated with this second entry. By prorating this percentage occurrence to the 270 MMBF target, it was possible to roughly estimate the second entry by VCU. By adding this second entry to the harvest for this project (estimated by Alternative 5) plus previous harvests, this represents the total projected harvest within the CPOW Project Area through the life of the Long-Term Contract. For this analysis to project the percentage of the sawtimber available for harvest within the Project Area that will have been harvested by the expiration of the LTS contract, it is necessary to make two assumptions:

1. Previous timber harvest has occurred in areas where the standards and guidelines of the Forest Plan revision no longer permit timber harvest, e.g., streamcourse buffers, 500-foot saltwater buffers, etc. For the purposes of this analysis, it is necessary to assume that past harvests approximate land that can be reharvested.

2. The 1991-92 MELP identified likely areas for future harvest. Other potential areas may exist. For the purposes of this analysis, it is necessary to assume that the MELP gives a good approximation of potential future harvest units.

By comparing projected cumulative harvest through the end of the KPC contract with the sum of past harvest plus the remaining, unharvested MELP units, it is possible to estimate the percentage of available sawtimber that will have been harvested by the end of the KPC contract. This is displayed in Table 3-39.

Table 3-39
Cummulative Effects of Next Timber Entry into CPOW Area, by VCU

VCU	Past Harvest	CPOW Project*	Next Entry	Cum Harvest	Percent CFL	% Available Saw-timber Harvested by End of Contract**
549	1,276	117	224	1,617	44	66
550	3,972	502	305	4,779	67	85
551	161	30	137	328	17	37
552	1,378	0	584	1,962	31	44
553	37	0	299	336	10	21
554	2,580	275	223	3,078	52	82
557	2,279	153	121	2,553	86	87
571	4,700	754	536	5,990	55	80
572	1,716	167	207	2,090	54	74
573	4,113	383	1,102	5,598	32	56
574	4,062	28	415	4,505	42	72
577	4,510	369	436	5,315	53	78
579	3,732	617	260	4,609	69	90
580	2,409	618	451	3,478	37	75
581	6,539	224	464	7,227	54	80
582	99	0	180	279	12	28
583	3,702	465	443	4,610	55	76
584	4,050	475	629	5,154	54	70
585	4,520	281	236	5,037	68	87
586	2,839	61	60	2,960	52	94
587	2,850	381	177	3,408	49	90
588	10,391	1,945	1,039	13,375	66	85
589	3,467	312	599	4,378	34	66
590	3,663	672	302	4,637	49	88
593	0	79	21	100	NA	NA
598	2,651	775	381	3,807	45	81
599	0	445	169	614	NA	NA
600	10	0	0	10	NA	NA
Total	81,709	10,128	10,000	101,837		75

* Estimated by Alt. 5.
** Estimated by previously harvested areas plus units identified in 1992 MELP.

By the year 2004 (when the Long-Term Contract with KPC expires), approximately 75 percent of the currently identified available sawtimber within the CPOW Project Area will have been harvested. During the remaining 50 years of the forest rotation, future harvest can occur on the remainder of this land.

The 1991-92 MELP identified 53,101 acres of available sawtimber within the CPOW Project Area. Of this, 10,128 acres are projected for harvest under the CPOW Project (estimated by Alternative 5). By the end of the Long-Term Contract, another 10,000 acres are scheduled by the 10-Year Timber Sale Plan (Appendix A). Between the

end of the Long-Term Contract in 2004 and the end of the forest rotation in 2054 (approximately), future timber harvest within the CPOW Project Area will occur on these lands, as summarized in Table 3-40.

Table 3-40
Future Timber Harvest within CPOW from 2004 to 2054, in Acres

Potentially harvestable	53,101 acres
CPOW harvest under this EIS	10,128 acres
Next entry	10,000 acres
Total remaining	32,973 acres
Average harvest (50 years)	659 acres
Average harvest (25 MBF/acre)	16 MMBF

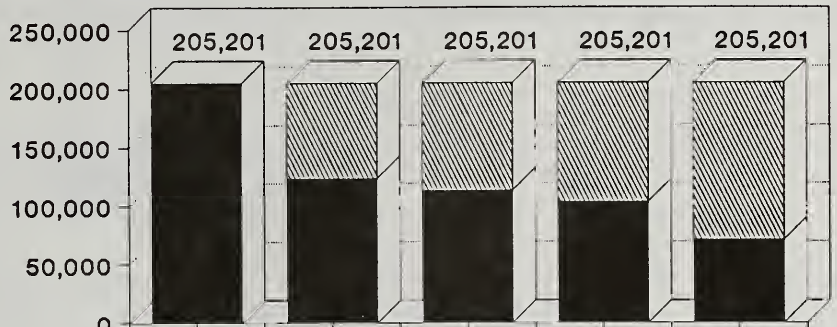
After completion of the Long-Term Contract, until second-growth stands become available, the CPOW Project Area should be able to contribute an average of 16 MMBF per year to the overall Ketchikan Area timber sale program. Because some of the remaining units identified in the 1991-92 MELP have identified resource concerns (very highly unstable soils, visual quality objectives, TTRA-mandated buffers, potential Wild and Scenic River corridors, etc.), it is likely that less than this amount will actually be available for harvest—possibly as low as 10 MMBF per year. Yearly sell targets may vary depending on the prevailing Forest Plan ASQ level, as well as congressional direction and funding. Once second-growth stands become available for harvest, timber production will once again increase in the Project Area.

Cumulative harvest

According to the Forest Plan revision, all tentatively suitable lands within the Project Area will be harvested by the end of the first forest rotation. Appendix A shows the proposed harvests which will occur within the Project Area through the end of the KPC contract. Subsequent Forest Plans will schedule other areas for decadal timber harvests.

Figure 3-17 shows the relative components of second growth and mature sawtimber with respect to the potentially harvestable lands within the CPOW Project Area. Five time frames are examined: 1954 (start of KPC contract), 1993 (before CPOW), 1996 (after CPOW), 2004 (end of KPC contract), and 2054 (end of first forest rotation).

Figure 3-17
Proportion of Second Growth and Mature Sawtimber in Lands Available for Harvest



	1954	1993	1996	2003	2054
Second growth	0	81,709	91,837	101,837	134,436
Old growth	205,201	123,492	113,364	103,364	70,765

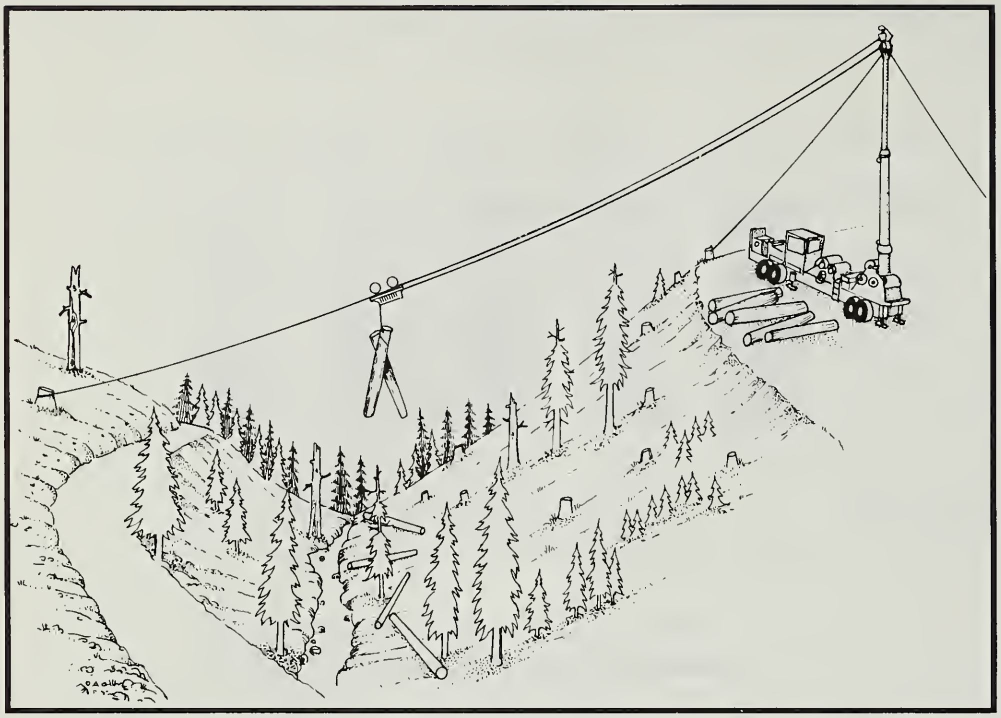
Old growth   Second growth

Long-term productivity

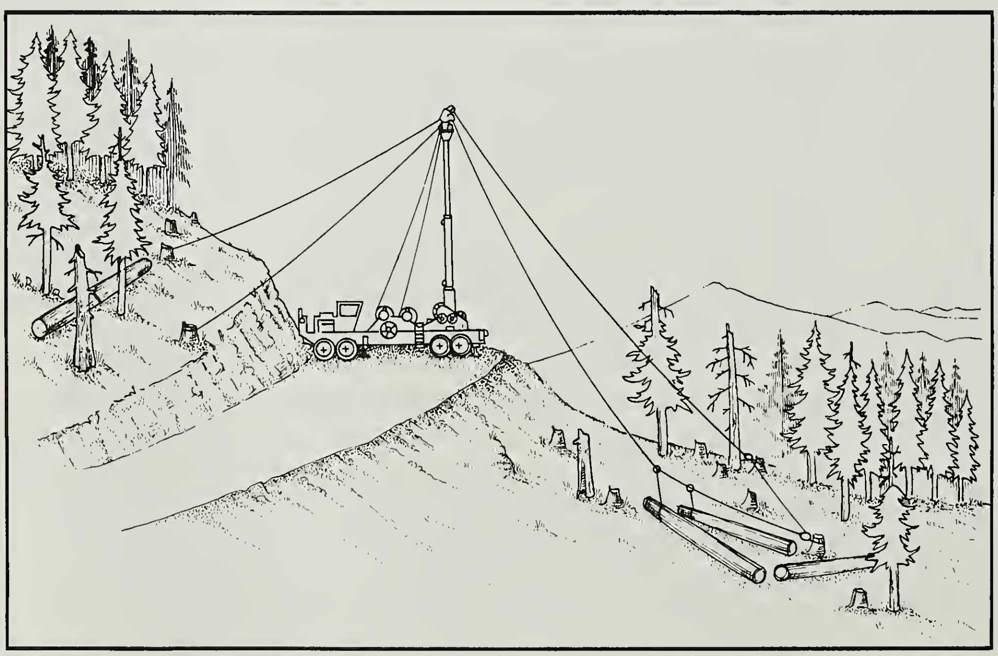
The effects of all action alternatives on long-term timber productivity is the conversion of unmanaged, overmature stands to managed, faster growing second-growth stands. All harvested stands are representative of uneven-aged western hemlock stands that commonly take hundreds of years to develop under natural conditions.

There is expected to be an increase in the proportion of Sitka spruce in the second-growth stands. Current uneven-aged stands average 25 percent spruce by volume, while even-aged stands 75–100 years of age average about 50 percent. With the use of precommercial thinning, the spruce component may increase up to 60 percent.

Log grade in second-growth stands is expected to be lower than in old-growth stands, even on sites that have been precommercially thinned. Most second-growth stands will have less variation in tree diameter and height than existing old-growth stands. In addition, second-growth stands will have considerably less volume in the higher grades of logs. Nevertheless, total yield will be significantly greater in second-growth stands, resulting in the production of more useable wood fiber. These stands are expected to have increased timber yield over the existing old-growth stands because of improved stocking, less defect, and increased percentage of higher volume species. It has been estimated that these second-growth stands will yield 54 MBF per acre on the average. Assuming all the areas that have been previously harvested (81,709 acres) can be harvested again and that that all the areas remaining to be harvested through the end of the first rotation can also be re-harvested (53,101 acres), the average annual yield for the second rotation would be approximately 73 MMBF.



—Skyline logging - slackpulling carriage (clearcut).



—Highlead logging (clearcut).

Different types of cable logging. From USDA Forest Service 1985.

WILDLIFE

Key Terms

Carrying capacity - the maximum number of a wildlife species that a certain area will support through the most critical period of the year
Habitat - the sum total of environmental conditions of a specific place that is occupied by an organism, population, or community of plants or animals
Habitat capability - an estimated number of animals that a habitat can sustain
Management Indicator Species (MIS) - species of vertebrates and invertebrates whose population changes are believed to best indicate the effects of land management activities
Viable population - the number of individuals of a species required to ensure the continued long-term existence of the population in natural, self-sustaining populations, adequately distributed throughout their region
Wildlife Analysis Area (WAA) - division of land identified by the Alaska Dept. of Fish and Game and used by the Forest Service for wildlife analysis

Affected Environment

Alaska's wildlife are valuable for aesthetic, economic, recreational, ecological, and subsistence reasons. Over 300 species of mammals, birds, amphibians, and reptiles occur on the Tongass National Forest, and most of these can be found in the Central Prince of Wales (CPOW) Project Area. They occupy a diverse range of land types, plant communities, and special habitats (including the unique cave resources in the Project Area, discussed in the Cave Resources section of this chapter), and are variably adapted to climatic extremes, change in habitat, predation, and hunting pressure.

Management Indicator Species (MIS)

Management Indicator Species (MIS) are species of vertebrates and invertebrates whose population changes are believed to best indicate the effects of land management activities (USDA Forest Service 1982). Through the MIS concept, the total number of species occurring within a Project Area is reduced to a manageable set of species that collectively represent the complex of habitats, species, and associated management concerns. The MIS are used to assess the maintenance of population viability (the ability of a population to sustain itself naturally) and biological diversity, and to assess effects on species in public demand (TLMP Draft Revision 1991a).

The following have been selected as Management Indicator Species for this project and will be discussed in detail in this chapter:

SPECIES	RATIONALE FOR SELECTION
Sitka black-tailed deer	Important game species
Marten	Diversity (old growth); important furbearer
Black bear	Represents estuarine habitat; game species
Bald eagle	Old-growth coastline; high public interest
River otter	Represents riparian habitat; furbearer
Hairy woodpecker	Cavity excavator
Brown creeper	Represents large, high volume, old-growth trees
Vancouver Canada goose	Represents riparian habitat; game species

The following species were selected as Tongass National Management Indicator Species, but have not been selected as MIS for the CPOW project:

SPECIES	RATIONALE FOR NONSELECTION
Red-breasted sapsucker	Adaptable and abundant in Project Area
Red squirrel	Does not occur in Project Area
Brown bear	Does not occur in Project Area
Mountain goat	Does not occur in Project Area

Wildlife Analysis Areas (WAA's)

Wildlife Analysis Areas (WAA's) represent divisions of land identified by the Alaska Department of Fish and Game (ADF&G) and used by the Forest Service for wildlife analysis. WAA's included in the CPOW Project Area are illustrated on Fig. 3-18. Specific VCU's that are included within Project Area WAA's are listed in Table 3-41.

Table 3-41

VCU's Within Wildlife Analysis Areas (WAA's) and Percent of the WAA that the Project Area Includes

WAA	% of WAA in Project Area	VCU's
1315	40	584, 585, 586, 598, 599
1319	25	579, 580, 585, 586
1420	64	572, 581, 582, 583
1421	62	552, 573, 574, 577
1422	73	554, 557, 571, 587, 588, 589, 590
1527	13	549, 550, 551, 553
1530	27	550, 551, 553

Figure 3-18
Wildlife Analysis Areas

WAA's
Wildlife Analysis Areas (WAA's) are divisions of land designated by the Alaska Department of Fish and Game and used by the USDA Forest Service for wildlife analysis.

Wildlife Habitats

Habitat is the type of environment in which a species occurs. The environment can be described in physical or biological terms, which often includes elevation, topography, or type of vegetative community. A species may occupy a range of different habitats or more than one distinct kind of habitat in different seasons. Terrestrial habitats inventoried in the CPOW Project Area include:

- Beach fringe
- Estuary fringe
- Riparian
- Forest
  - Old-growth forest
  - Second-growth forest
- Alpine/subalpine
- Open Muskeg (Peatlands)

A brief description of these habitats follows. Table 3-42 displays an acreage inventory of each habitat by Wildlife Analysis Area (WAA). A summary of percentages of the Project Area included in each terrestrial habitat type is shown in Figure 3-19. Note that because several categories overlap each other (e.g., "Beach Fringe" may contain some "old-growth" and some "riparian" habitats), the sum of the total acres will not be the same as the total acreage announced for the Project Area. MIS wildlife species use of each habitat type is shown in Figure 3-20.

Table 3-42
Wildlife Habitats in the CPOW Project Area, 1992 (by Wildlife Analysis Area), in Acres*

WAA	Beach Fringe	Estuary Fringe	Old-Growth Forest	Second Growth Forest	Non-commercial Forest	Total Forest	Alpine Subalp	Riparian	Open Muskeg
1315	4,428	2,024	24,756	15,761	537	41,054	458	1,588	2,110
1319	0	1,558	9,930	5,970	707	16,607	2,587	59	2,607
1420	468	580	16,149	12,826	457	29,432	3,642	2,572	3,264
1421	1,144	204	30,706	13,403	477	44,586	1,781	9,220	4,726
1422	2,766	1,714	40,148	29,452	2,607	72,207	2,746	2,191	10,398
1527	408	6	2,398	1,244	0	3,642	0	301	1,861
1530	736	312	8,666	4,060	110	12,836	0	2,491	3,393
Total	9,950	6,398	132,753	82,716	4,895	220,364	11,214	18,422	28,377

*Certain categories overlap. For example, old-growth and second-growth forest are also included in beach fringe and estuary fringe habitats.

Figure 3-19
Wildlife Habitats in CPOW Project Area (percentage)

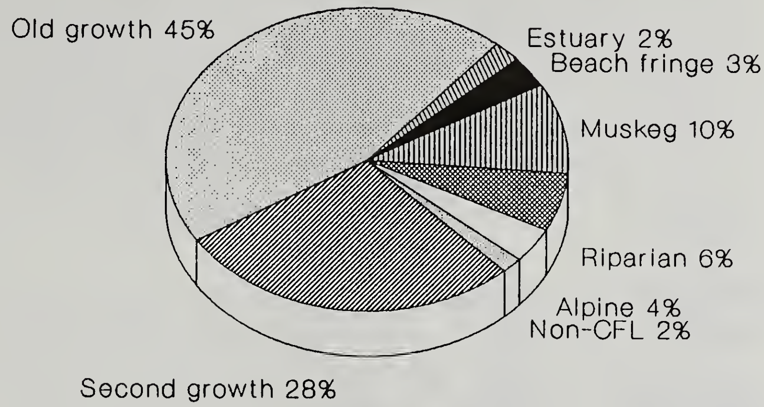


Figure 3-20
Principal Habitats Used by Management Indicator Species

SPECIES	HABITATS: Beach Fringe	Estuary Fringe	Riparian	Old Growth	Alpine/Subalpine
Sitka Blacktailed Deer	◆	◆	◆	◆	◆
Black Bear	◆	◆	◆	◆	◆
Otter	◆	◆	◆	◆	
Marten	◆	◆	◆	◆	
Brown Creeper				◆	
Hairy Woodpecker				◆	
Vancouver Canada Goose	◆	◆	◆	◆	
Bald Eagle	◆	◆	◆	◆	

Beach Fringe

This category includes land lying within 500 feet of the mean high tide and excludes estuarine habitat units. Areas within 500 feet of the ocean shoreline are transitional zones between land and water, salt and freshwater, and vegetated and nonvegetated conditions (USDA Forest Service 1979a). Forested areas in this transitional zone are heavily used by species with high economic, recreational, subsistence, or aesthetic values. Black bear, river otter, bald eagle, marten, black-tailed deer, and Vancouver Canada goose concentrate their activities during some seasons in these forest stands. Many of these species exhibit a strong association with old-growth forest stands. No alternatives in the CPOW EIS propose any timber harvest within beach fringe.

Estuary Fringe

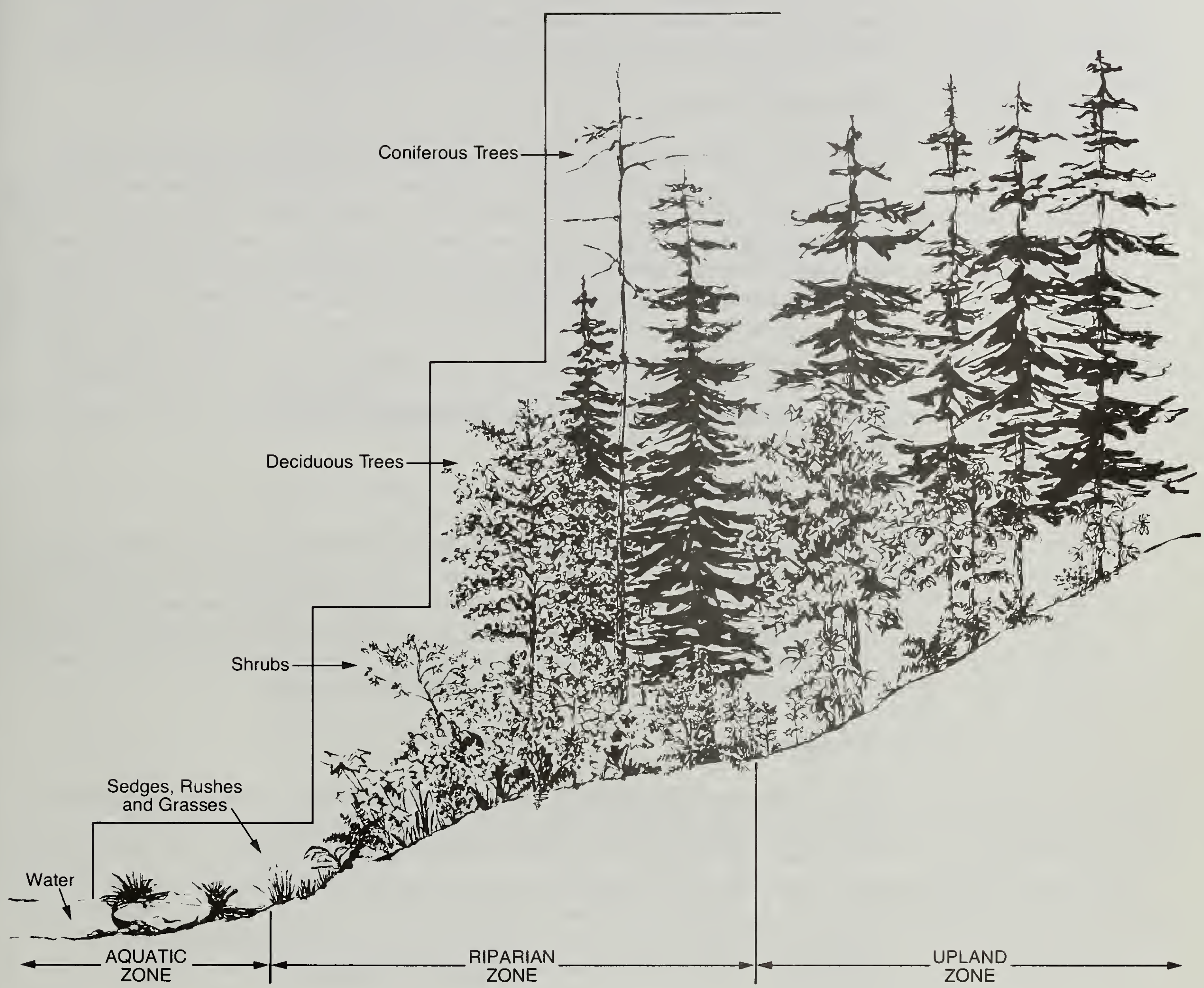
Estuary fringe habitat is a 1,000-foot zone around estuaries. Bears, waterfowl, furbearers, and eagles are the primary users of estuary fringe habitat. The estuary fringe areas are identified to quantify alteration of that habitat. The estuary fringe is similar to beach fringe, but because of species diversity, it has a greater value to wildlife, especially black bears, river otters, mink, bald eagles, and waterfowl. No harvest is proposed for harvest within the estuary fringe.

Riparian

The riparian habitat is recognized as some of the most diverse and productive habitat in Southeast Alaska. It occurs along rivers and streams or around inland lakes, and contains elements of both aquatic and terrestrial ecosystems. Many wildlife species use riparian zones disproportionately more than other areas (USDA Forest Service 1985), and Project Area riparian habitats are extremely important for eagles, furbearers, and black bears (USDA Forest Service 1986a). Riparian areas are important migration routes for some wildlife species, and serve as travel routes for numerous species because of the presence of water, food, and cover.

For the purpose of this section, riparian habitat was quantified by Class I and II stream and lake AHMU zones. (This is more expansive than the definition of riparian areas based on soil types, which was used in the Soils section of this chapter, in order to more accurately reflect wildlife use of riparian habitats.) Alternatives described in this EIS do not propose any harvest adjacent to Class I or II streams or lakes larger than 10 acres; the width of all proposed buffer strips is at least 100 feet. For additional information regarding Riparian Area management, see the Soils and Fisheries sections of this chapter.

Figure 3-21
Riparian Area Characteristics



Riparian zones are transitional between aquatic and upland zones (which include forested wetlands). They provide water, food, and cover important for many wildlife species.

SOURCE: USDA Forest Service 1985.

Forest

Forest habitat includes all areas with forest cover, including old growth and second growth described below, and noncommercial forest land as described in the Timber and Vegetation section of this chapter. Many wildlife species, including those associated with old-growth stands, use all forested areas within the Project Area.

Old-growth Forest

Old-growth forest is characterized by stands of trees usually well past the age of maturity with declining growth rates and signs of decadence, such as dead and dying trees, snags, and downed woody material. The stand usually includes large diameter trees, multi-layered canopies, a range of tree diameter sizes, and the notable presence of understory vegetation. These and other characteristics make old-growth forests important habitat for Sitka black-tailed deer, martens, black bears, and cavity nesting birds such as the hairy woodpecker. These forests are in a dynamic, steady state where the death of old trees is balanced by the growth of new trees. Old-growth forest acres are also included in beach fringe, estuary fringe, riparian, and other habitat areas. For a more detailed discussion of old-growth vegetation, see the Old-growth and Biodiversity section of this chapter.

Second-growth Forest

Second-growth forest is defined for the purposes of this section as consisting mostly of areas that have been commercially clearcut. Large-scale second-growth stands are of lower value to wildlife such as deer, martens, bears, and cavity nesters because conifer seedlings aggressively invade and eventually shade out desirable herbaceous vegetation. This habitat type was inventoried to help display the amount of past timber harvest activity that has occurred within the CPOW Project Area.

Alpine/Subalpine

The alpine category includes all stands at or above treeline, including unvegetated areas of permanent snow and ice; open meadows of grasses, forbs, and shrubs; and scrub forest (Sidle and Suring 1986). Subalpine habitat includes a mosaic of forested, scrub, and unforested stands that occur at higher elevation than the upland forest, at the lower edge of the alpine zone (Sidle and Suring 1986). Alpine/subalpine habitat within the CPOW Project Area is generally above 2,000 feet in elevation. These habitats are important summer foraging areas for deer and black bears.

Open Muskeg (Peatlands)

Muskegs are most often characterized by stunted yellowcedar and shore pine, along with sedges and other bog vegetation. Muskegs dominated by sphagnum moss or tall sedge cover smaller areas. The water table is at the surface, and numerous small ponds are scattered throughout the muskeg.

Wildlife Habitat Capability Models

Wildlife models were used to calculate rough population estimates, based on habitat capability, for each Management Indicator Species (MIS) in the project. For specific information on the models used, see Appendix B of the TLMP Draft Revision. Due to the amount of timber harvest on private land, a worst-case scenario was assumed, and

no habitat capability was calculated for state, private, or encumbered lands (see Land Status section of this chapter).

The terms "habitat capability" and "populations" are not interchangeable. Habitat capability is synonymous with carrying capacity or the estimated number of animals the habitat can support during a typical year. Population is the estimated number of animals actually present at a given time. Populations may temporarily exceed habitat capability (for example, due to a series of mild winters). However, many populations are frequently below what the habitat is capable of producing, due to predation, winter mortality, or other ecological factors.

Given data limitations, the complexity of ecological relationships, and the need to simplify variables for use in the models, actual population sizes in some areas may vary considerably from those predicted by the analysis. However, the procedures provide the best available estimate of habitat capability.

Table 3-43
Wildlife Habitat Capability within the CPOW Project Area

Selected MIS	1954*	1993**	Percent Change
Sitka black-tailed deer	14,942	9,409	-37
Marten	671	469	-30
Black bear	552	477	-14
Bald eagle	518	336	-35
River otter	192	126	-34
Hairy woodpecker	7,725	3,522	-54
Brown creeper	17,725	5,113	-71
Vancouver Canada goose	1,020	972	- 5

* Habitat Capability for just the portion of WAA's in the Project Area.
** This habitat capability was calculated assuming all units in LTS 89/94 were harvested. For estimated habitat capabilities assuming no harvest of remaining 89-94 units, see Effects of the Alternatives portion of this section.
SOURCE: Matson 1992. Data derived from GIS data base and interagency habitat capability models.

Sitka Black-tailed Deer

The Sitka black-tailed deer was chosen as an MIS because it is an important game and subsistence species and is seasonally associated with old-growth forests.

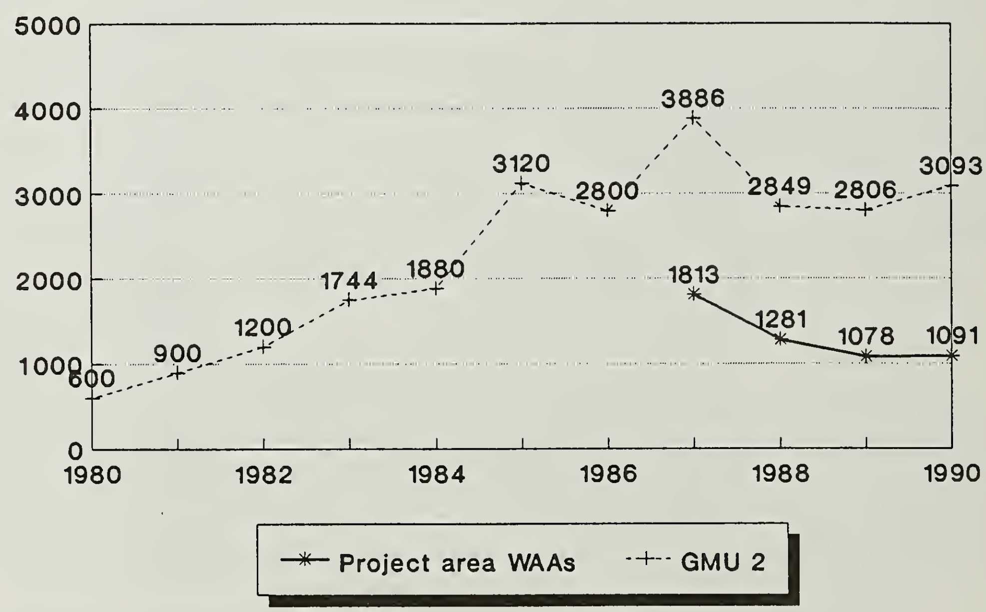
Historically, population fluctuations of Sitka black-tailed deer in Southeast Alaska have been linked with winter severity (Merrian 1970) and predation pressure (Van Ballenberge and Hanley 1984). Deep snow and late springs associated with severe winters have occurred several times in the past 80 years. Deer die-offs are common during severe winters, even in the best old-growth winter ranges. Predators of deer—gray wolves, bears, and hunters—contribute to the population decline during these winters, inhibiting subsequent recovery of the deer population. In general, winter severity increases with latitude and with maritime influence in Southeast Alaska (Longhurst and Robinette 1981); winters tend to be less severe on Prince of Wales Island than in northern and eastern sections of Southeast Alaska.

Research conducted near Juneau, Alaska, indicates that high volume, old-growth forests at lower elevations are essential to maintaining deer populations during severe winters (Schoen et al. 1985; Klein 1965; Hanley and Rose 1987). Large, strong branches characteristic of the old-growth stands intercept snow, providing for deer mobility while maintaining available forage. High volume stands of old-growth forests support adequate herb and shrub layers of deer forage.

Deer populations on Prince of Wales Island gradually have been rebuilding from the effects of hard winters during the late 1960's and early 1970's. Populations have recovered to the point where antlerless seasons similar to those of the 1950's, 1960's, and 1970's could safely be reinstituted (Population Objectives, ADF&G 1991).

Deer harvest in Game Management Unit 2 (which includes Prince of Wales Island and all the outer islands that form the Prince of Wales Archipelago) has gradually been increasing from the early 1980's to 1985. Since 1985, the reported harvest has fluctuated from a low of 2,800 in 1986, to a high in 1987 of 3,886 (see Figure 3-22).

Figure 3-22
Deer Harvest in Game Management Unit 2 and the Project Area WAA's, 1980-1990



SOURCE: Matson 1992. Data compiled from ADF&G harvest data.

An interagency model was developed to evaluate the potential quality of winter habitat for Sitka black-tailed deer. Winter is assumed to be the most limiting season for the Sitka black-tailed deer throughout the area (Hanley and McKendrick 1985, cited by Suring et al. 1991). The deer model incorporated the following factors in the analysis: (1) snow conditions, (2) presence of predators, (3) physiographic features including aspect and elevation, and (4) stand size including: (a) volume class of old growth, (b) forest type, (c) second growth (25–150 years), and (d) clearcut (0–25 years).

Results of the deer model indicate habitat existing in 1993 in the CPOW Project Area is capable of supporting an estimated 9,409 deer (Table 3-43). This represents a 37

percent reduction in habitat capability since the start of the KPC contract in 1954 because of timber harvest. Table 3-44 shows habitat capability by WAA at current conditions and before 1954.

Table 3-44
Deer Habitat Capability by WAA, 1954 and 1993

WAA	1954 Hab. Cap.*	1993 Hab. Cap.*
1315	3,705	1,544
1319	906	509
1420	1,877	975
1421	2,714	2,137
1422	4,492	3,382
1527	307	231
1530	941	631
TOTAL	14,942	9,409

*Habitat capability for the portion of the WAA within the Project Area.
SOURCE: Matson 1992. Data derived from GIS data base and Suring et al. 1988.

Marten

The marten was selected as an MIS to represent old-growth associated species and because it is an important furbearer. Marten populations are moderate in the Project Area. Trapping pressure is high due to the concentration of roads in the Project Area. High pelt prices, susceptibility to trapping pressure, liberal trapping regulations, and easy access to new trapping areas has created a large demand for marten.

Martens prefer mature old-growth forests with a well developed overhead canopy. Most snags and downed woody debris are important to martens for winter and summer dens and resting sites, and for cover for prey species. The distribution and abundance of martens is determined to a large extent by the availability of cover and the presence of prey species (Simon 1980).

Throughout the year, especially in the winter, small mammals are an important food source for martens. During the summer their diet is supplemented by birds, insects, fruits, and berries.

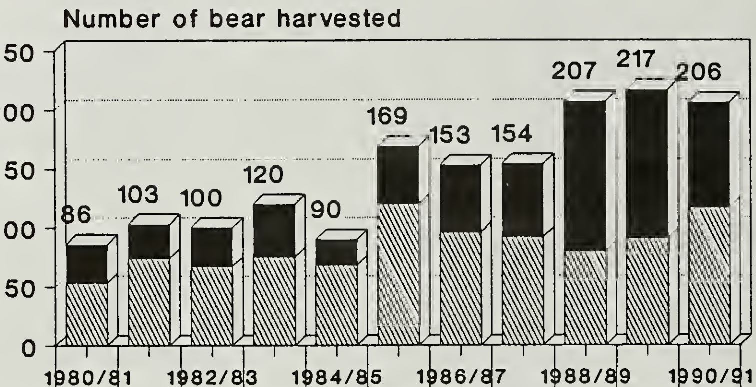
The model was developed to evaluate the potential quality of winter habitat for the marten (Suring et al. 1988a). The underlying assumption is that if adequate winter habitat is available, habitat requirements throughout the rest of the year will not be limiting. The model incorporated the following factors in the analysis: (1) classes of timber volume in old-growth forests, (2) stand size classes (stand age), (3) beach fringe habitat, (4) riparian habitat, and (5) elevation.

The marten model indicates there is habitat capable of supporting an estimated 469 martens in the CPOW Project Area (Table 3-43). This is a 30 percent decline from 1954 habitat capability.

Black Bear

The black bear was selected as an MIS to represent estuarine habitat and because it is an important game species. Black bears occur thoughout the Project Area and populations are currently stable, but they have experienced a dramatic increase in harvest levels during the past couple of years (D.Larsen ADF&G Pers. Comm. Figure 3-23). As of the 1990/91 black bear harvest season, nonresident hunters have been limited to one black bear, while Alaska residents can still harvest two black bear.

Figure 3-23
Black Bear Harvest in Game Management Unit 2, by Residency



Non-residents	33	29	33	45	22	49	57	62	127	126	89
Alaskan residents	53	74	67	75	68	120	96	92	80	91	117

Alaskan residents   Non-residents

SOURCE: Matson 1992. From ADF&G harvest data compiled by Doug Larsen, Area Wildlife Biologist

Black bears are highly adaptable and can tolerate moderate disturbances, such as habitat alteration, as long as the basic requirements for food and cover are satisfied (Lawrence 1979). As clearcut stands mature, both forage resources and numbers of denning sites may decline.

After emergence from dens in the spring, black bears seek sources of new plant growth for food (Mondafferi 1982). Grass flats of estuaries, low elevation forests near the beach (beach fringe habitats) and avalanche slopes provide the needed high quality forage. Estuaries receiving heavy spring bear use include the Thorne Bay, Exchange Cove, Barnes Lake, and Sweetwater Lake areas. During the summer, black bears feed on forbs, berries, and salmon. In the fall they feed on berries and forbs (Sidle and Suring 1986) in the subalpine areas. The Thorne River, Hatchery Creek, and Staney Creek areas are important travel corridors and feeding areas during the salmon runs.

Bear den sites include: (1) cavities in trees and stumps, (2) caves, and (3) excavated and natural depressions under tree roots, stumps, and fallen logs. The characteristics of preferred den sites in Southeast Alaska—hollow logs and trees in dense shrub growth—are typically associated with old-growth forests (Erickson et al. 1982). Black bears search for food in clearcuts that provide access to cover, which is found in

mature and old-growth forests. Clearcuts 10 to 15 years old are preferred because of the production of large amounts of berries (Lindzey and Menslow 1977).

The model for black bears incorporated the following factors in the analysis: (1) the average annual value of upland habitats, (2) the average annual value of riparian habitats and potential salmon production, and (3) the average annual value of beach fringe habitats. For more information regarding the model see: Suring et al. 1988b.

The black bear model indicates the habitat is capable of supporting an estimated 477 black bears in the CPOW Project Area (Table 3-43). This is a 14 percent decline from the pre-1954 habitat capability.

Bald Eagle

The bald eagle was selected as an MIS because the public has a strong interest in the species and the species has special habitat requirements. Bald eagle habitat is defined as beach fringe habitat. The majority of eagles in Southeast Alaska nest in coniferous forest habitats along the coastline and associated saltwater inlets (Suring et al. 1988c). Eagles prefer to nest in continuous stands of old-growth rather than in narrow leave strips of old-growth trees. Of the 3,850 nests surveyed in Southeast Alaska, 92 percent were within 300 feet of the shoreline (Hodges and Robards 1982).

Bald eagles nest adjacent to the habitat that provides the best opportunities for foraging or searching for food, such as over open water and on tidal flats. Eagles primarily feed on fish, but are also known to feed on waterbirds, marine invertebrates, and drifting carrion. Perching sites near the nest and foraging areas are also important components of bald eagle habitat. The bald eagle and its habitat have been given special protection through an Interagency Agreement between the Forest Service and the U.S. Fish and Wildlife Service (USDA Forest Service and USDI Fish and Wildlife Service 1990), and by the Bald Eagle Protection Act. Among the provisions of the Interagency Agreement are: requirement of a 330-foot buffer around eagle nests, timing restrictions for blasting, and a requirement that formal consultation with the Fish and Wildlife Service take place when any portion of the MOU cannot be implemented. The U.S Fish and Wildlife Service has identified 80 nest sites in the CPOW Project Area. Table 3-45 displays the number of identified eagle nests which occur in each WAA.

Table 3-45
Number of Eagle Nests by WAA

WAA	# Nests
1315	28
1319	0
1420	13
1421	6
1422	20
1527	5
1530	8
TOTAL	80

SOURCE: Matson 1992. Data derived from GIS data base.

The model evaluated only the nesting habitat of bald eagles because limited information is available on the winter habitats and movements of bald eagles in Southeast Alaska (Suring et al. 1988c). The model considered the following factors in the analysis: (1) old-growth forest, (2) volume class, (3) distance from shore, and (4) elevation of riparian habitat.

The model indicates there is suitable nesting habitat capable of supporting an estimated 336 eagles (Table 3-43). This is a 35 percent decline from the pre-1954 habitat capability.

River Otter

The river otter was selected as an MIS to represent riparian habitats and because it is an important furbearer.

River otters concentrate along intertidal zones and the adjacent narrow beach fringe. They also travel extensively throughout streamside habitats. The old-growth forests in Southeast Alaska are assumed to provide optimum habitat for river otters (Suring et al. 1988d), with seedling and sapling (i.e., clearcut) and pole timber stands providing limited habitat. Otters avoid clearcuts extending to the beach in Southeast Alaska (Larsen 1983) because of lack of cover and density of shrub growth. High value otter habitat must provide adequate shelter in addition to sufficient food (Melquist and Hornocker 1983). River otters feed on fish (primarily sculpins and rockfish), crabs, and occasional invertebrates other than crabs (Sidle and Suring 1986).

River otters depend on large woody debris (LWD) in streamside, lakeside, and beach habitats. The large extensive root systems, downed tree trunks, and overturned root wads of old-growth trees create undercuts and hollows that maintain den and resting sites, and cover. From May through July, female otters use old-growth habitats near streams for inland (up to 0.5 miles from the coastline) dens. The annual harvest of river otter on the Tongass National Forest has varied from a high in 1979-80 of 652 animals, to a low of 373 animals in the 1986-87 harvest season. Harvest numbers are a function of both otter abundance and trapper effort.

Habitat capability for this species was determined for spring (May through July) because river otters make use of all occupied habitats at this time of year (Suring et al. 1988d). The model incorporated the following factors in the analysis: (1) distance from salt water, (2) beach, (3) estuary, (4) elevation of riparian habitat, (5) volume class, (6) stream class, and (7) lake size.

The model indicates that habitat for river otter in the CPOW Project Area is capable of supporting an estimated 126 otters (Table 3-43). This is a 34 percent decline in habitat capability from the pre-1954 habitat capability, primarily due to past harvest activity.

Hairy Woodpecker

The hairy woodpecker was chosen as an MIS representing cavity users because of its preference for stands of old-growth western hemlock and Sitka spruce, and for its association with snags (standing dead trees). Hairy woodpeckers are year-round residents in Southeast Alaska and use snags and partially dead trees for nesting and foraging. These woodpeckers feed on larvae of wood-boring beetles, other insects, and seeds and berries in winter (Sidle and Suring 1986).

The hairy woodpecker is important as a primary cavity excavator because by drilling holes in trees it creates habitat needed for other wildlife species (Kesseler 1979; Noble and Harrington 1977). Forty-two species of mammals and birds in Southeast Alaska nest or den in tree cavities. Included are woodpeckers, owls, hawks, waterfowl, bats, squirrels, martens, and otters. Several of these species depend exclusively on cavities in the large diameter snags characteristic of old-growth stands for nest and den sites. Most cavity nesting or denning species would be represented by hairy woodpeckers and respond similarly to proposed activites.

Hairy woodpecker habitat is defined as volume class 4–7 stands below the subalpine zone. Availability of suitable winter habitat for roosting and foraging is considered an important constraint on the habitat suitablity of the hairy woodpecker. The model (Suring et al. 1988e) incorporates the following factors in the analysis: (1) old-growth forests; (2) volume class; and (3) black cottonwood stands.

The model indicates there is suitable winter habitat in the CPOW Project Area to support an estimated 3,522 hairy woodpeckers (Table 3-43). This is a 54 percent decline from the pre-1954 habitat capability.

Brown Creeper

The brown creeper was chosen as an MIS because it is associated with large, old-age trees and represents the old-growth forest community. The diet of brown creepers consists of larvae, pupae, and eggs of insects gleaned from the crevices of bark; spiders; other small invertebrates; and occasionally seeds (Pearson 1923, Reilly 1968). Large diameter trees are preferred because a bird can feed longer on a large tree and capture more prey per visit (Airola and Barrett 1985). Brown creepers and other bark foraging birds also select larger diameter trees as foraging sites during cold, windy weather to lessen their exposure (Willson 1970, Grubb 1975, Webber 1986).

The abundance of large coarse-barked trees and the length of the vertical foraging height appears to affect the territory size (Apfelbaum and Hanley 1977); the area necessary to support the birds increases as the number of large, tall trees decreases. Brown creepers spend most of their time foraging on live parts of trees rather than dead trees (Morrison et al. 1987).

Brown creeper habitat is defined as volume class 6 and 7. Slightly more than one tenth of the number of brown creepers observed in stands with 30,000 board ft. per acre were observed in stands with 20-30,000 board ft. per acre (i.e., volume class 5) (Hughes 198-5). Other habitats in Southeast Alaska were not considered to provide suitable habitat for brown creepers.

The model indicates there is suitable habitat in the CPOW Project Area to support an estimated 5,113 brown creepers (Table 3-43). This is a 71 percent decline from the pre-1954 habitat capability.

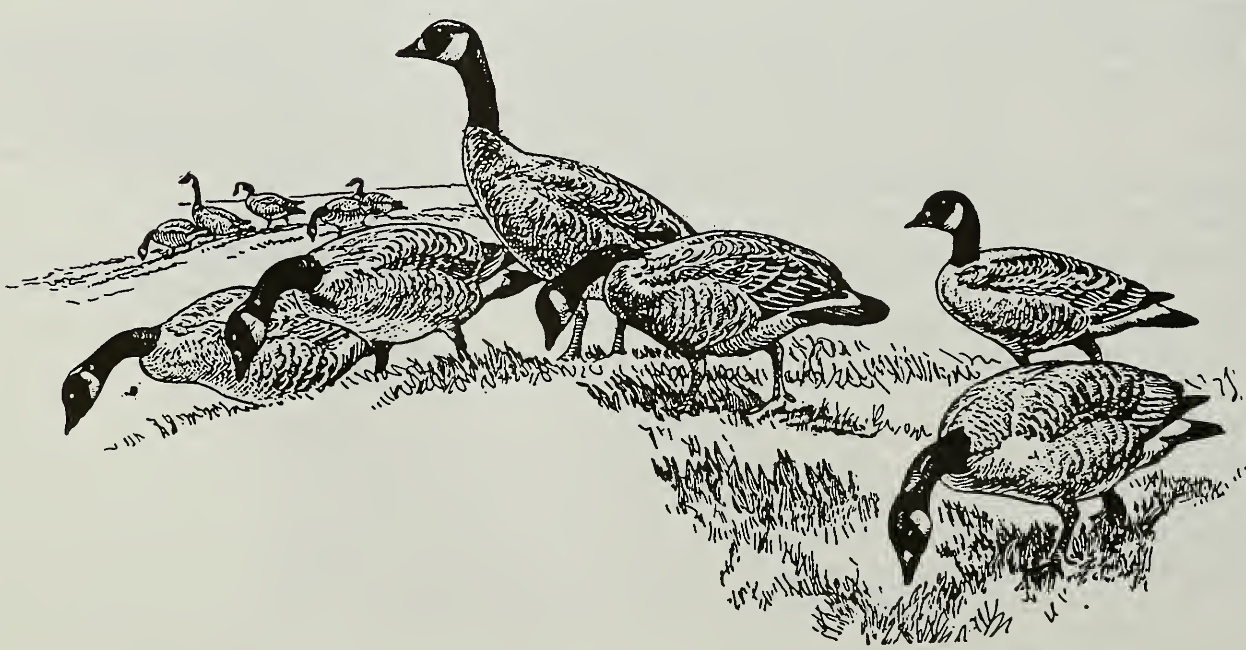
Vancouver Canada Goose

The Vancouver Canada goose was selected as an MIS to represent old-growth and riparian habitats. The Vancouver Canada goose is also a game species.

Banding studies have indicated Vancouver Canada geese are primarily nonmigratory (Ratti and Timm 1979) and are found almost exclusively in Southeast Alaska. These geese use forested habitats for nesting and brood rearing: they build nests in trees, use trees for perches during incubation, and rely primarily on forest understory plant species for food during this part of their life cycle (Doyle et al. 1988). Lebeda and Ratti (1983) suggest that the three most important factors for nesting Vancouver Canada geese are: (1) dense understory vegetation, (2) forest surface water, and (3) an abundant food source. The Vancouver Canada goose is solitary by nature and avoids disturbance. For this reason, habitat within 330 feet of open roads is not considered suitable.

For analysis of Vancouver Canada goose habitat suitability, the following habitats were selected: estuaries, anadromous streamsides, and lakesides. Muskegs are also important habitats for the geese, but cover such numerous acres of the Project Area that they are not a limiting factor; muskegs therefore were not included in the habitat analysis for this species.

The model indicates there is suitable habitat in the CPOW Project Area capable of supporting an estimated 972 Canada geese (Table 3-43). This is a 5 percent decline from the pre-1954 habitat capability.



Effects of the Alternatives

This analysis considers the direct, indirect, and cumulative effects of timber management in the Project Area. Effects are projected to 1996, the anticipated end of the current proposed action; to 2004, which includes the reasonably forseeable future and the end of the KPC long term sale contract; to 2040, to show the cumulative impacts of past, proposed, and what TLMP has scheduled for harvest; and 2140, to show the cumulative impacts of harvesting all the tentatively suitable lands through the first rotation and half way through the second.

Direct and Indirect Effects

Comparison of Alternatives: Effects on Wildlife Habitat

Each action alternative unavoidably includes harvest of wildlife habitat. Project unit design criteria, BMP's (FSH 2509.22, 1991), and/or legislated protective measures (TTRA) significantly reduce the impacts to beach fringe, estuary fringe, and riparian habitats in each alternative. Alpine/subapine habitat is also affected very little by road and unit location because of inaccessibility and/or low productivity. Project Area-wide changes in these habitats are one percent or less for each alternative (Table 3-46). Impacts to MIS dependent on these habitats are similarly low. Alternatives 0 and 1, the no-action alternatives, will harvest no acreage, with the effect that existing wildlife habitats will remain at current levels, with changes over time due only to natural succession or other ecological events.

Table 3-46
Acres and Percent of Wildlife Habitats Proposed for Harvest, by Alternative

		Alt.1		Alt.1a		Alt 2		Alt 3		Alt 4		Alt 5	
	Existing Acres	Acres Cut	% Chg	Acres Cut	% Chg	Acres Cut	% Chg	Acres Cut	% Chg	Acres Cut	% Chg	Acres Cut	% Chg
Beach Fringe	9,950	0	0	0	0	0	0	0	0	0	0	0	0
Estuary Fringe	6,398	0	0	0	0	0	0	0	0	0	0	0	0
Riparian	18,422	0	0	0	0	28	<1	39	<1	69	<1	53	<1
Old Growth	132,753	0	0	0	0	9,764	7	10,210	8	9,137	7	9,632	7
Alpine/Subalp.	11,214	0	0	0	0	31	<1	35	<1	0	0	40	<1

SOURCE: Matson 1992. Data derived from GIS data base.

Beach Fringe. None of the alternatives proposes any timber harvest within the 500-foot beach fringe zone.

Estuary Fringe. None of the alternatives proposes any timber harvest within the 1,000-foot estuary fringe zone.

Old-Growth Forest. Most of the productive forested area in the Project Area is old-growth timber. Within some harvest units are scattered patches of nonforested or low productivity forest types. The biggest difference among the alternatives is the total number of acres scheduled for harvest for each particular alternative.

Alternatives 2, 4, and 5 each harvest 7 percent of the existing old-growth forest. Alternative 3 harvests 8 percent. The effects of old-growth habitat loss on old-growth associated species are reflected in "Habitat Capability for MIS" later in this section.

Alpine/Subalpine. None of the alternatives proposes any timber harvest for alpine/subalpine habitats.

Comparison of Alternatives: Effects on Habitat Capability

The previous section discusses changes to wildlife habitats used by the MIS. This section discusses how those changes in habitats affect the potential habitat capability for each MIS. As mentioned in the Affected Environment earlier in this section, the models that estimate the capability of habitats to support selected species are not necessarily accurate reflections of actual populations in the Project Area. Actual population levels are not known at this time. However, effects on habitat capability as projected by the models are considered adequate information on which to make a decision regarding alteration of habitats and the subsequent effects on wildlife populations.

Adequate habitat capable of supporting viable wildlife populations in the North Central Prince of Wales Ecological Province (TLMP Draft Revision, 1991a) is maintained with each alternative. Increased access could increase harvest of martens, black bears, and wolves through increased pressure from hunting and trapping. Since the Project Area is accessible by communties on Prince of Wales Island via the road system and by other Southeast Alaska communities via the Alaska Marine Highway System, an access management strategy will be used to mitigate potential effects of increased hunter pressure. Road management objectives will be implemented on a road-by-road basis depending on resource values and other management activities.

Several MIS show a habitat/use relationship with the size of preferred habitats. The wildlife models for this analysis do not take into account those patch size relationships, but still provide an effective comparison between alternatives. The potential effects of patch size and human developments are included in Figures 3-3 through 3-8, in the Old-Growth and Biodiversity section of this chapter. Direct impacts to black bears, otters, and bald eagles have been greatly reduced in all action alternatives through avoidance of timber harvest in beach fringe, estuary fringe, stream corridors, riparian, and alpine/subalpine habitats.

Alternative 1 would have no direct effect on habitat capabilities for any MIS. Tables 3-47 through 3-54 display the changes in habitat capabilities, measured against Alternative 1, that would occur under Alternatives 1a through 5.

Sitka Black-tailed Deer. Sitka black-tailed deer are dependent on low elevation, high volume, old-growth stands during severe winters, and are the MIS most affected by proposed timber harvest under the action alternatives. Alternative 4 would decrease habitat capability 3 percent in the Project Area while Alternatives 2, 3, and 5 would decrease habitat capability 2.8 percent, 2.7 percent and 2.9 percent, respectively (see Table 3-47).

Second-growth canopy closure in timber stands 20 to 30 years after harvest may be delayed by thinning to promote forage production (Hanley et al. 1989). Second-growth forest management has been widely used in Southeast Alaska, but benefits to Sitka black-tailed deer have not been well demonstrated.

Table 3-47
Changes in Habitat Capability for Deer to Year 1996

	Alt.1	Alt.1a	Alt.2	Alt.3	Alt.4	Alt.5
Habitat Capability	9,409	9,444	9,146	9,156	9,123	9,132
Change in Capability	0	+35	-263	-253	-286	-277
Percent Change	0	+<1%	-2.8%	-2.7%	-3%	-2.9%

Black Bear. Avoidance of beach fringe, estuary fringe, stream corridors, and riparian habitat with timber harvest is reflected in a less than one percent decline in black bear habitat capability for all action alternatives. All action alternatives would harvest habitat capable of supporting an estimated 3 black bears, representing a .6 percent decline in habitat capability (Table 3-48).

Table 3-48
Changes in Habitat Capability for Black Bear to Year 1996

	Alt.1	Alt.1a	Alt.2	Alt.3	Alt.4	Alt.5
Habitat Capability	477	477	474	474	474	474
Change in Capability	0	0	-3	-3	-3	-3
Percent Change	0	0	-.6%	-.6%	-.6%	-.6%

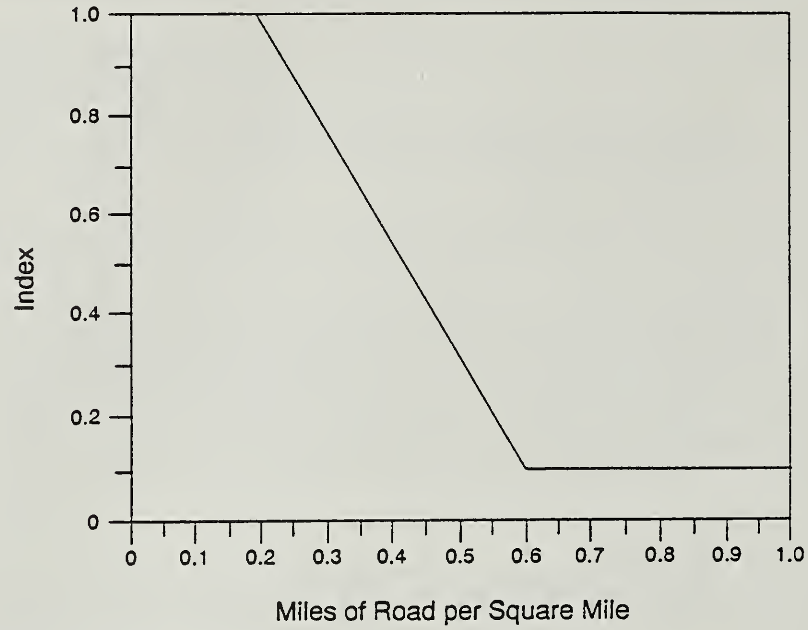
Marten. The marten is an old-growth associated species that uses a wide range of old-growth volume classes, tree species, and landscape positions. Alternative 2 would harvest habitat capable of supporting an estimated 20 martens, for a 4.3% percent decline in habitat capability. Alternatives 2, 3 and 4 would decrease habitat capability 4.5 percent. See Table 3-49. Martens are easily trapped and can be overharvested, especially where trapping pressure is heavy (Strickland, et al., 1982) and not effectively controlled. Without an access management plan to keep road densities less that 0.5 miles of road per square miles, there could be an additional 85 percent reduction in population levels due to trapping (Figure 3-24). Impacts would be minimal where roads are closed to motorized use following timber harvest or when restrictions are placed on using vehicles for hunting or trapping.

Table 3-49
Changes in Habitat Capability for Marten to Year 1996*

	Alt.1	Alt.1a	Alt.2	Alt.3	Alt.4	Alt.5
Habitat Capability	469	473	449	448	448	448
Change in Capability	0	+4	-20	-21	-21	-21
Percent Change	0	+1%	-4.3%	-4.5%	-4.5%	-4.5%

* Without road density effects.

Figure 3-24
Hypothetical Effect of Road Density on the Capability of Habitats to Support Marten Without Adequate Safeguards to Prevent Overharvesting



Source: Suring et al. 1988

River Otter. The otter is another species that benefited from measures taken during unit design which limited timber harvest in beach fringe, estuary fringe, stream corridors, and riparian habitat. All action alternatives decrease habitat capability by 1.6 percent or less in the Project Area. Alternative 2 would harvest habitat capable of supporting an estimated 2 otter. Alternatives 2, 4, and 5 would harvest habitat capable of supporting an estimate of 1 otter (Table 3-50).

Table 3-50
Changes in Habitat Capability for River Otter to Year 1996

	Alt.1	Alt.1a	Alt.2	Alt.3	Alt.4	Alt.5
Habitat Capability	126	126	124	125	125	125
Changes in Capability	0	0	-2	-1	-1	-1
Percent Change	0	0	-1.6%	-.8%	-.8%	-.8%

Hairy Woodpecker. The hairy woodpecker is a primary excavator that prefers high volume, old-growth timber, but can also effectively use lower volume stands. Alternatives 2 and 4 would decrease habitat capability 7 percent in the Project Area; alternatives 3 and 5 would decrease habitat capability by 4 percent (Table 3-51). Hairy woodpeckers may also benefit from snag retention in clearcuts as a mitigation of timber harvest (see Chapter 2).

Table 3-51
Changes in Habitat Capability for Hairy Woodpecker to Year 1996, by Alternative

	Alt.1	Alt.1a	Alt.2	Alt.3	Alt.4	Alt.5
Habitat Capability	3,522	3,552	3,286	3,395	3,295	3,375
Change in Capability	0	+30	-236	-127	-227	-147
Percent Change	0	+<1%	-7%	-4%	-7%	-4%

Brown Creeper. The brown creeper is highly dependent on large old-growth trees. All action alternatives would remove habitat capable of supporting an estimated 144 (Alt. 3) to 319 (Alt. 2) brown creepers (Table 3-52). Alternative 3 would decrease habitat capability by 3 percent, while Alternatives 5, 4 and 2 would be 4, 6 and 6 percent repectively.

Table 3-52
Changes in Habitat Capability for Brown Creeper to Year 1996

	Alt.1	Alt.1a	Alt.2	Alt.3	Alt.4	Alt.5
Habitat Capability	5,113	5,192	4,794	4,969	4,806	4,908
Change in Capability	0	+79	-319	-144	-307	-205
Percent Change	0	+2%	-6%	-3%	-6%	-4%

Vancouver Canada Goose. The Vancouver Canada goose nests in forested areas in proximity to wetlands and preferred food plants. All action alternatives would harvest habitat capable of supporting an estimate of between 29 (Alt. 2 and 5) and 31 (Alt. 3) geese in the Project Area (Table 3-53). All action alternatives would decrease habitat capability 3 percent in the Project Area.

Table 3-53
Changes in Habitat Capability for Vancouver Canada Goose to Year 1996

	Alt.1	Alt.1a	Alt.2	Alt.3	Alt.4	Alt.5
Habitat Capability	972	975	943	941	942	943
Change in Capability	0	+3	-29	-31	-30	-29
Percent Change		+<1%	-3%	-3%	-3%	-3%

Bald Eagle. Scheduling development activities away from beach fringe, estuary fringe, lake buffers, and Class I and II streams would effectively reduce impacts to bald eagle habitat. Habitat capability decreases 1.5 percent under Alternatives 2 and 5, 0.9 percent under Alternative 3, and 1.2 percent under Alternative 4 (Table 3-54). Management activities within 330 feet of an eagle nest site are restricted by an Interagency Agreement between the Forest Service and the U.S. Fish and Wildlife Service (USDA Forest Service and USDI Fish and Wildlife Service 1990). There are no known nest sites which would require a variance to construct proposed new roads.

Table 3-54
Changes in Habitat Capability for Bald Eagle to Year 1996

	Alt.1	Alt.1a	Alt.2	Alt.3	Alt.4	Alt.5
Habitat Capability	336	336	331	333	332	331
Change in Capability	0	0	−5	−3	−4	−5
Percent Change	0	0	−1.5%	−.9%	−1.2%	−1.5%

Comparison of Alternatives: Summary

Table 3-55
Summary of Changes in Habitat Capability to Year 1996

Species	1954	1993	Alt. 1 1996	Alt. 1 % Chg*	Alt. 1a 1996	Alt. 1a % Chg	Alt. 2 1996	Alt. 2 % Chg	Alt. 3 1996	Alt. 3 % Chg	Alt. 4 1996	Alt. 4 % Chg	Alt. 5 1996	Alt. 5 % Chg
Deer	14,942	9,409	9,409	-37	9,444	+<1	9,146	-39	9,156	-39	9,123	-39	9,132	-39
Black Bear	552	477	477	-14	477	0	474	-14	474	-14	474	-14	474	-14
Marten	671	469	469	-30	473	+ 1	449	-33	448	-33	448	-33	448	-33
Otter	192	126	126	-34	126	0	124	-35	125	-35	125	-35	125	-35
Hairy Woodpecker	7,725	3,522	3,522	-54	3,552	+<1	3,286	-57	3,395	-56	3,295	-57	3,375	-56
Brown Creeper	17,725	5,113	5,113	-71	5,192	+ 2	4,794	-73	4,969	-72	4,806	-73	4,908	-72
Vancouver Can Goose	1,020	972	972	- 5	975	+<1	943	- 8	941	- 8	942	- 8	943	- 8
Bald Eagle	518	336	336	-35	336	0	331	-36	333	-36	332	-36	331	-36

* Percent change is from 1954
SOURCE: Matson 1992. Data derived from GIS data base and interagency habitat capability models.

Cumulative Effects: Reasonably Foreseeable

Cumulative effects include past harvest, the proposed actions, and timber harvest in the reasonably foreseeable future. TLMP (1979a, as amended) projects timber harvest through the full 100-year rotation and half way into the second rotation. This portion of the analysis (reasonably foreseeable) will focus on effects to the year 2004, which is halfway through the rotation and the end of the Long-Term Contract with KPC.

The following assumptions were made for projecting the cumulative effects of timber harvest through 2004:

Approximately 270 MMBF of additional timber will be harvested from the Project Area by the year 2004 to meet contractual obligations.

Future impacts to beach fringe, estuary fringe, stream corridors, riparian, and alpine/subalpine habitats will be similar to those anticipated in the current alternatives.

Future timber harvest decreases the habitat capability for MIS the same amount as Alternative 4 of CPOW does (because Alternative 4 comes closest to the 270 MMBF harvest figure). For example, if Alternative 4 (278 MMBF) reduces deer habitat capability by 250, the harvest of another 270 MMBF will reduce the deer habitat capability by another 250.

Habitat Capability for MIS in 2004 and Total Cumulative Impacts in 2040

Decreases in habitat capabilities projected to the end of the Long-Term Contract in 2004 are displayed in Table 3-56. Effects projected from 1996 to 2004 were based on the reduction in habitat capability anticipated for Alternative 4. This took into account the more stringent resource protective measures currently used to design harvest units, and enabled projection of effects without knowledge of exact location of future harvest units.

The total cumulative impacts are also displayed in Table 3-56; this takes into account the effects of canopy closure on units harvested by Alternative 4 and doubling those impacts for the harvest of the "reasonably foreseeable future" units.

Table 3-56
Reasonably Foreseeable Changes in Habitat Capability, 1954-2004, including Total Cumulative Impacts to the Year 2040

Species	Habitat Capability 1954	Habitat Capability 1993	Habitat Capability 2004	Percent Reduction From 1954	Habitat Capability 2040	Percent Reduction From 1954
Sitka black-tailed deer*	14,942	9,409	8,855	41	8,475	43
Black bear	552	477	471	15	457	15
Marten*	671	469	427	36	421	43
River Otter	192	126	124	35	124	35
Hairy Woodpecker*	7,725	3,522	2,793	64	2,793	64
Brown Creeper	17,725	5,113	4,703	73	4,703	73
Vancouver Canada Goose	1,020	972	914	10	914	10
Bald Eagle	518	336	326	37	326	37

Based on Alt.4, because Alt.4 volume of 278 MMBF comes closest to projected 270 MMBF volume for next CPOW entry.
*Does not consider effects of forest fragmentation or road densities.
SOURCE: Matson 1992. Data derived from GIS data base and interagency habitat capability models.

Table 3-57 displays the impacts of harvesting all areas in the Project Area TLMP has defined as suitable-available for timber harvest, and assumes all harvested stands are in the closed canopy, second-growth condition.

Table 3-57
Total Cumulative Changes in Habitat Capability, 1954-2004, including Total Cumulative Impacts to the Year 2140

Species	Habitat Capability 1954	Habitat Capability 1993	Habitat Capability 2004	Percent Reduction From 1954	Habitat Capability 2140*	Percent Reduction From 1954
Sitka black-tailed deer	14,942	9,409	8,855	41	3,782	75
Black Bear	552	477	471	15	186	66
Marten	671	469	427	36	185	72
River Otter	192	126	124	35	106	45
Hairy Woodpecker	7,725	3,522	2,793	64	446	94
Brown Creeper	17,725	5,113	4,703	73	602	97
Vancouver Canada Goose	1,020	972	914	10	352	65
Bald Eagle	518	336	326	37	166	68

Based on Alt.4, because Alt. 4 volume of 278 MMBF comes closest to projected 270 MMBF volume for next CPOW entry.
*Assumes harvest of all suitable-available forest lands identified by the TLMP Draft Revision, Alt. P (1991a) within the Project Area.
SOURCE: Matson 1992. Data derived from GIS data base and interagency habitat capability models.

Deer Population Objectives

The Alaska Department of Fish and Game (ADF&G) has established deer population objectives for all WAA's in Southeast Alaska. The population objectives for the individual WAA's can be found in "Population Objectives–Strategic Plan for Management of Deer in Southeastern Alaska 1991-95" (ADF&G 1991).

Deer population objectives for the WAA's range from maintaining deer habitat at 100 percent of the 1954 level to 75 percent of the 1954 level. It is difficult to compare the effects of the proposed project on deer habitat capability as compared to the population objectives because the project affects only portions of seven different WAA's. A complete analysis of how projected timber harvest levels affect deer habitat capability compared to the ADF&G population objectives can be found in the TLMP Draft Revision (1991a).

CAVE RESOURCES

Key Terms

Cave – any naturally occurring void, cavity, recess, or system of interconnected passages which occurs beneath the surface of the earth or within a cliff or ledge and which is large enough to permit an individual to enter
Doline or sinkhole – relatively shallow, bowl- or funnel-shaped depressions ranging in diameter from a few to more than 3,000 feet
Cave Resources – any material or substance occurring in caves on Federal lands, such as animal life, plant life, paleontological resources, cultural resources, sediments, minerals, speleogens, and speleothems
Karst – a type of topography that develops in areas underlain by soluble rocks, primarily limestones. Dolines, collapsed channels, vertical shafts, and caves are formed when the subsurface layer dissolves. Areas on which karst has developed is said to display "karst topography" or is referred to as a "karst landscape".
Smolts – young salmon or trout that move from freshwater streams to saltwater
Speleothem – any natural mineral formation or deposit occurring in a cave or lava tube, including but not limited to any stalactite, stalagmite, helictite, cave flower, flowstone, concretion, drapery, rimstone, or formation of clay or mud
Speleogen – relief features on the walls, ceiling, and floor of any cave or lava tube which are part of the surrounding bedrock
Grike – solution-widened joints, faults, and/or bedding contacts in a karst area
Runnels – solution channels carved by water into bedrock, either on flat or inclined surfaces
Phreatic – the water-saturated zone beneath a water table. Phreatic caves are formed when the bedrock beneath the water table dissolves under pressure flow conditions. Phreatic caves generally have a sub-circular cross-section.
Vadose – the unsaturated zone above the water table. Vadose caves are formed when bedrock dissolves and erodes under free flow conditions, such as by streams. This results in the entrenchment of that stream and a cave passage resembling a canyon or narrow slot.

Affected Environment

Introduction

A cave is legally defined under federal law as: "... any naturally occurring void, cavity, recess, or system of interconnected passages which occurs beneath the surface of the earth or within a cliff or ledge and which is large enough to permit an individual to enter, whether or not the entrance is naturally formed or man-made. Such term shall include any natural pit, sinkhole, or other feature which is an extension of the surface" (Federal Cave Resource Protection Act, 1988).

Speleologists or cave explorers use "cave" to refer to all parts, regardless of size, of an underground system that links openings and chambers and that may connect the system to the surface. The most common type of cave is formed in limestone by dissolution. Included in the term caves are tree molds and lava tubes associated with lava flows, erosional caves, and those formed by dissolution of bedrock.

The Federal Cave Resources Protection Act (FCRPA) was passed in 1988 to secure, protect, and preserve significant caves on Federal lands for the perpetual use, enjoyment, and benefit of all people. Within the Tongass National Forest, cave and cave resources generally occur in areas of karst topography, or areas that are underlain by soluble rocks, primarily limestones.

Inventory of karst topography to identify caves and cave resources is the first step to understand what "significant" resource values exist. Caves and cave resources are classified as "significant" if during survey the authorized officer determines that the cave has biological, cultural, mineralogical, paleontologic, geologic, hydrologic, or other resources that have important values for scientific, educational, or recreational purposes. Caves with unusual or unique features, associations, or recognition are also considered significant.

Although the FCRPA charges the Forest Service with protection only of "significant" caves, the Tongass National Forest is working to protect all important karst resources. Until resource values are determined, the Ketchikan Area is considering all caves to be significant.

Geologic Setting

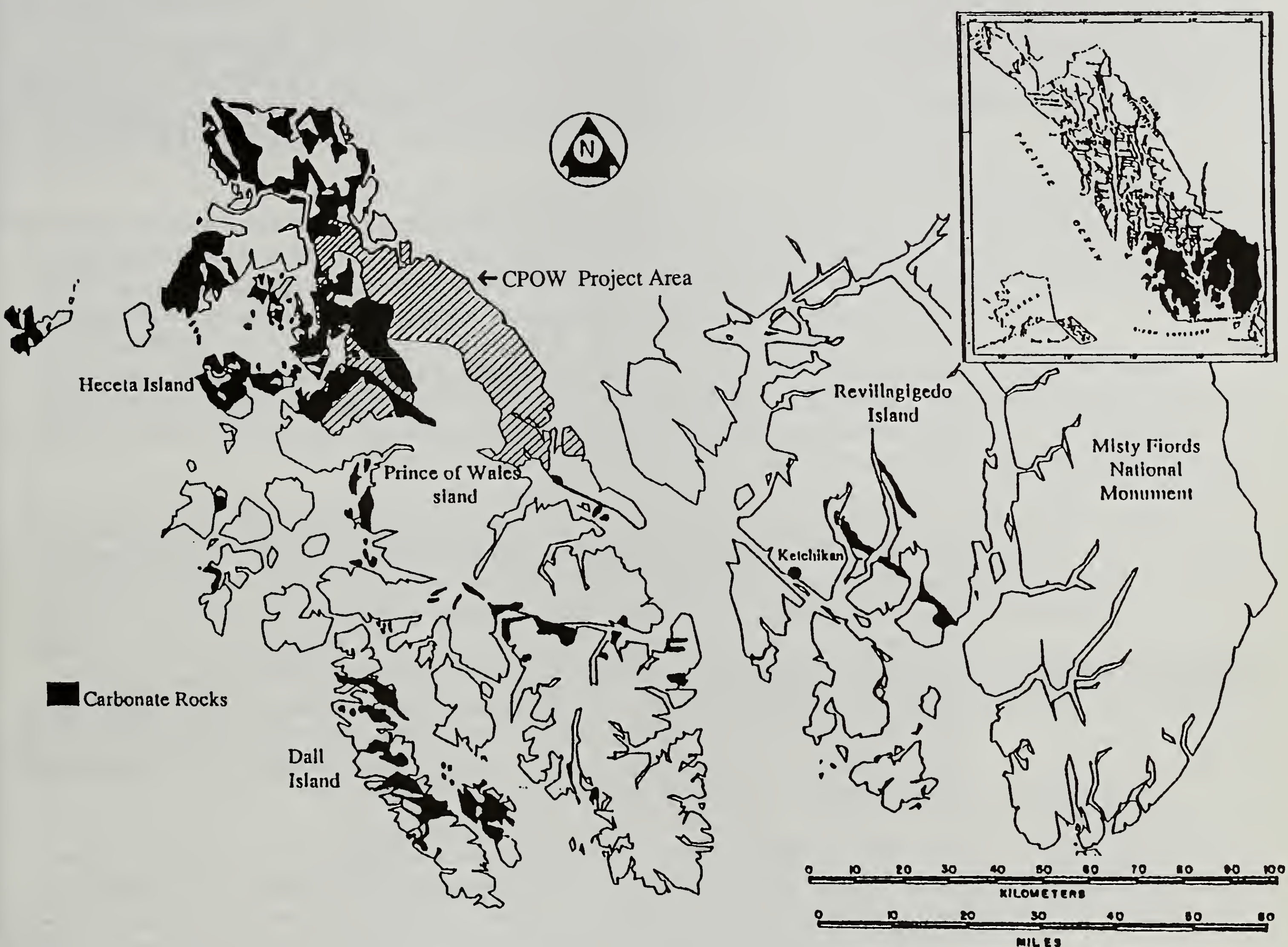
The geology of Southeast Alaska is very complex. The bedrock includes rock formations that range in age from 1.5 billion years to the present time (Berg et al. 1988, Brew et al. 1984, Eberlein et al. 1983, Gehrels and Berg 1991). Portions of five tectonostratigraphic rock formations are found in the Area (Berg et al. 1988). Karst development is limited mainly to outcrops of limestone that is 420–350 million years old. Locally these have been changed chemically to marble.

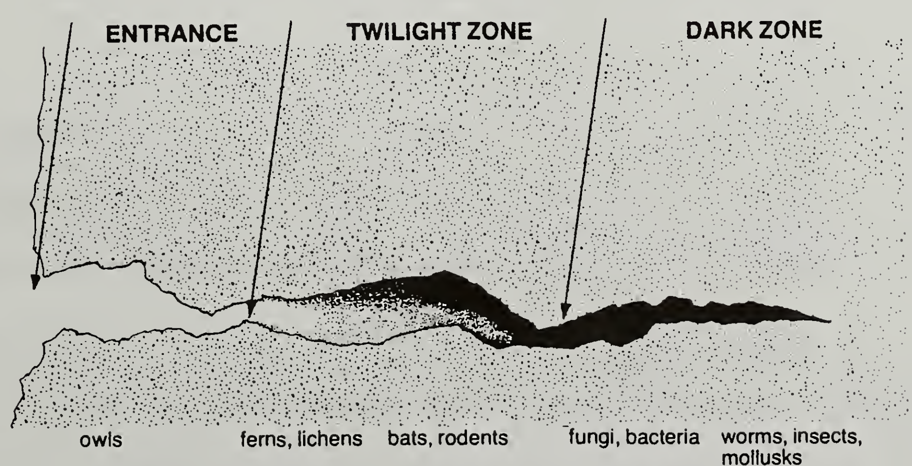
Some 950 square miles of carbonate rocks underlie the Ketchikan Area. All but 25 square miles of carbonate are found on Prince of Wales Island and the surrounding islands. Two thin bands of Permian marble are exposed on Revillagigedo Island (Berg et al. 1988). On Heceta Island, the Heceta Limestone has a maximum stratigraphic thickness of 9,900 feet but the total thickness of the formation probably exceeds 12,000 feet. The limestones are massive or thick-bedded, fine grained, commonly fractured, light- to medium-dark gray, and in places contain fossils (Berg et al. 1988, Brew et al. 1984, Eberlein et al. 1983, Gehrels and Berg 1991).

Structurally the area is dominated by large, northwest-southeast trending, high-angle faults. Many of these are deeply eroded and very visible from the air. These faults break the area into blocks of carbonate and non-carbonate bedrock.

Figure 3-25 illustrates known occurrences of carbonates on the Ketchikan Area.

Figure 3-25
Known Occurrences of Carbonates on the Ketchikan Area





—Diagram of a cave showing zones and representative examples of life forms present.

Known Cave Resources on the Project Area

Caves are a portion of a karst terrain, but karst can develop without cave development. It is important to note that a cave is just one integral part of a karst terrain, and one cannot manage the cave resources without managing the karst resources.

For inventory purposes, the Project Area has been divided into non-karst areas, possible karst areas, and known karst areas. Approximately 24 percent of the CPOW Project Area is underlain by geology on which karst topography may have developed. It is estimated that 50 percent of the possible karst areas will actually have karst developed on it.

Until recently only a few local residents knew about some of the caves and significant karst features. With the passing of the FCRPA, the Ketchikan Area entered into a partnership with the Glacier Grotto, the local National Speleological Society (NSS) grotto, to help evaluate the cave resources. In 1990 the Area began a widespread inventory process to gain a better understanding of the extent and significance of the karst resources. Low and medium probability areas are being inventoried with the same intensity as the high probability areas. Emphasis is also placed on identifying cave resources within proposed timber sale units where surface management activities could result in damage of karst resources.

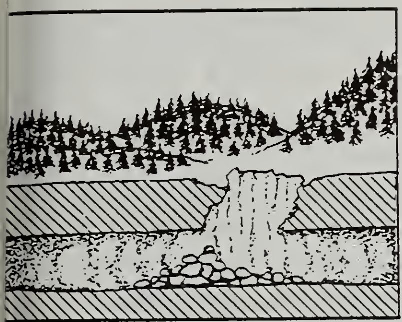
In the previous four years of cave inventory and exploration (1987-1990), some 57 caves had been inventoried (Metzler and Allred 1990); during the 1991 field season, some 96 new caves were discovered. Many of these were located within or adjacent to proposed timber harvest units. As of August 1992, more than 180 caves have been inventoried, approximately 25 of which lie within the CPOW Project Area. (Specific locational information on the 25 inventoried caves in the CPOW Project Area is protected to prevent any degradation of these non-renewable resources.) Many other caves have been reported by the public, most of which are within past timber harvest units. Hundreds, if not thousands of yet unexplored caves exist within the boundaries of the Ketchikan Area of the Tongass National Forest.

Historically, and presently, timber harvest has been highest on the lower elevation karst areas. These karst areas are well drained, and the nutrient rich soil grows the largest timber. Only recently has protection of the cave resources on the Area become a major concern. Currently, when significant karst resources are discovered, mitigation measures are applied to ensure protection of the feature. This mitigation is based on observations of the effect of timber harvest on karst features within old harvest units. Mitigation measures for this project are discussed in Chapter 2.

Factors Influencing Karst Formation

Significant karst is found from sea level to the top of the highest limestone peaks, 3,400 feet in elevation. The characteristics of the karst basically divide it into somewhat distinct types: low-level karst, which generally occurs below 1,100 feet elevation; and the sub-alpine and alpine karsts, which are found above 1,800 feet. The following generalizations can be made about the physical nature of the karst:

1. Development of the low-level karsts is a function of both geologic structure and the presence of muskegs. Muskegs form atop poorly drained non-carbonate rocks and glacial hardpans that lie above carbonates. Surface waters originating from these poorly drained areas seldom flow more than a few yards onto carbonate substrate before diving below the ground, down vertical shafts or into cave



Lava tubes

entrances. The highly acidic waters from the muskegs seem to accelerate cave development.

2. The cave passages that occur within the low-level karsts are characterized by one or more water-saturated zones above a narrow cave or canyon. The canyons generally widen towards the floor of the cave. Commonly the caves have a vertical entrance down a shaft greater than 30' deep. Evidence suggests that the caves predate the last glacial period. The caves are emerging from the glacial sediments that filled much of the systems.

3. The carbonate bedrock beneath the forest floor has been sculptured by the high rainfall and the organic acids of the forest floor. Roots following soil-filled fractures and structural features have guided surface waters downward. This karst surface is characterized by highly dissected, smoothed bedrock with many small pits, arches, and passages. Grikes are common in these areas.

4. Annual rainfall exceeds 180 inches per year in some of the areas where karst has developed. Evidence of the force of the tremendous volume of groundwater responsible for formation of the passages is everywhere in the cave passages. Scalloped walls, spiraling passages, ceiling pendants, deep plunge pools, frequent and dramatic water level fluctuations, flooded passages, and sumps are common. With large seasonal storms and frequent rain-on-snow events large volumes of water are forced through these passages. Boulders larger than two feet in diameter seasonally batter the walls of some passages. Walls, ceilings, and older rocks on the floor bear collision marks from battering during high flow periods.

5. Groundwater temperatures range from 36 to 40 degrees F. in most caves. Air temperature fluctuates around 40 degrees F. With few exceptions, caves in the Area are wet.

6. Above 1,800 feet elevation, sub-alpine and alpine karst is well developed; thousands of solution features per square mile may be present. These features form generally along structural weaknesses, sills, and dikes in the bedrock. Collapse and solution dolines are common where low gradient slopes are found at the higher elevations. Where massive carbonates are exposed, lines of pits and vertical shafts, and deep grikes form along structural features.

Between 1,800 and 2,400 feet elevation, the slopes support stunted alpine vegetation. Above 2,400 feet, little or no vegetation is found. Karst formation is driven by the high amounts of precipitation in these areas. The most recent glaciation has modified existing karst features leaving a thin mantle of glacial deposits in solution dolines, choking some features with glacial sediments. Frost wedging within some of the shafts and pits have choked the features with recent rockfall.

Surface Features and Cave Systems

Karsted surfaces found within the Ketchikan Area display many kinds of features. Only the low-level karst (below 1,100 feet) is found within the CPOW Project Area, so it is the only type of karst described below:

> Low-level karsts are characterized by large closed depressions, uvala, solution channels, collapse and solution dolines, doline fields, vertical shafts, solution runnels, grikes, and caves. All these features are surrounded and/or at least partially covered by dense vegetation. Cockpit/cone karst (Jennings 1987) have

been described from the northwestern corner of Prince of Wales Island (Allred 1989b).

The complex geology of the area is the key to location of the significant karst features. Timber type, vegetation patterns, slope, and proximity to muskeg soils all play a role in cave location. The majority of caves and significant karst features are discovered near the boundaries of rock formations and the fringes of muskegs. The location of significant karst features is controlled by the drainage patterns developed off the muskegs and by non-carbonate rock formations and structural weaknesses in the limestone and marble.

Many caves sump or choke within the first 100 feet. Vertical shafts, 30–80 feet deep, are commonly found adjacent to muskegs or rock formation boundaries. The majority of these are choked with glacial sediments and forest debris. Several caves have been mapped to a length of greater than 3,000 feet, and "El Capitan Cave" (outside the Project Area), the longest cave discovered so far, has 10,300 feet of surveyed passages and a total depth of 256.3 feet (Allred 1991).

Dolines, or depressions, are the most common karst feature encountered, often occurring in large numbers close together forming doline fields. Dolines over 200' in diameter and 100' in depth have been found. A typical cave within the low-level karsts has an entrance at the base of a 30-80 foot deep vertical shaft or collapse doline. These caves are characterized by a canyon which meanders along structural weaknesses in the limestone or marble.

Caves and Fisheries

Preliminary evidence and studies suggest that the karst waters are very important to the fisheries of the area. On-going studies with research facilities, universities, and Forest Service specialists, suggest that the karst waters and streams may be far more productive systems that the non-carbonate systems. It is known that salmon not only swim through the cave systems to spawn elsewhere, but are actually spawning within the cave passages. It is believed the karst waters have the following connection to fisheries:

1. The carbonates have important buffering effects. Very acidic waters flow from the muskegs (pH 4-5) into karst systems, emerging at a less acidic pH of 8-9.

2. Resident time for groundwater in the karst systems results in cool, even temperature water. Flow rates through caves are somewhat consistent. The storage capability of the karst systems results in lower peak flow events and higher low flow periods. This helps to moderate the effects of storm events on resurgence streams.

3. The cave systems filter out debris and sediments, although they do not filter out chemical impurities or microorganisms.

4. Smolts and resident trout use the cave systems for protection from predation, for shade, and for a feeding area.

5. Karst streams have a much greater and diverse aquatic insect population, both within the caves and in the streams.

Caves and Other Wildlife Species

Cave systems provide critical roosting and hibernating habitat for bats. The stable environment within the caves provides roosting habitat both in summer and winter. In winter, bats seek non-humid portions of caves beyond the area where the air freezes in order to hibernate.

In addition, some bird species—including dippers, thrushes, barn swallows, and lesser yellowlegs—have been known to use cave entrances for nesting and feeding. Rookeries for seabirds including cormorants and pigeon guillemots have been found in some littoral caves.

Other wildlife species also find the stable environment and unique habitat of cave resources to be valuable habitat. Caves have been used as natal den sites for otters, and as resting and denning sites for bears and small furbearers. Deer are known to rest around cave entrances both in summer, when the air coming from the caves is cooler, and in winter, when the cave entrance environment is warmer than elsewhere. Many species of insects and spiders overwinter in caves.

Effects of the Alternatives

Direct, Indirect, and Cumulative Effects

Types of Potential Impacts

Interruption of air and water connections. It is estimated that over 50 percent of the significant karst features that have been found on unharvested land are connected to the surface via air or water, and most can be still physically entered. In existing harvest units, less than five percent of the significant karst features still have an atmospheric connection, because past surface management activities, conducted before the passage of FCRPA, have filled in many features with sediment, logging slash, and debris.

When logs are yarded through and across dolines, a furrow is plowed into these unstable and oversteepened slopes. In old harvest units approaching 20 years in age, these furrows have not revegetated; sediments have run down the slopes and into the karst systems. Many of the caves begin as narrow canyons, and woody debris and sediment from logging can fill in the cave entrance and lower portions of the doline.

Many dolines have been filled in for forest road construction. The dolines historically have been a convenient place to funnel excess surface waters off road ways. Oversized materials and overburden from road and quarry development have been piled in large dolines. Dolines adjacent to landings previously were used not only for slash disposal but also for garbage disposal.

Indirect impacts on fisheries. It is not known what effect timber harvest has on the aspects of karst waters that contribute to fish productivity described earlier in this section.

Indirect impacts on other biotic communities and cave development. When the forest is intact the trees act as a buffer, allowing acidic water (typical of karst areas) to flow into the karst systems at a slow enough rate that the acids can be neutralized. Removal of timber and disturbance of the forest floor may destroy the buffer, which may result in faster influx of larger volumes of water than the present karst systems can handle. This may lead to an increased acidity of the groundwater

within the karst systems, which may accelerate cave formation rates, dissolve certain cave features, and change the geochemistry of the productive resurgence streams. Thus, by making the streams more acidic, the biotic communities and cave development may be altered.

Public use. Timber harvest activities include the construction and reconstruction of roads, which may lead to an increase in public use of caves. Such increased access would provide recreational opportunities for public exploration and enjoyment of cave resources. However, increased public use may increase the risk of destruction of cave resources through inadvertent damage, heavy use, unethical caving practices, and ground disturbing activities.

Specific CPOW Potential Impacts

Alternatives 1 and 1a, the no-action alternatives, would result in no further effects on the cave resources. The remaining action alternatives (2–5) under consideration for the CPOW Project Area will differ in their impacts on the cave resources. Table 3-58 summarizes the acres of known and possible karst falling within CPOW harvest units.

Table 3-58
Acres of Known and Potential Karst Within Proposed Harvest Units

	Alt.1	Alt.1a	Alt.2	Alt.3	Alt.4	Alt.5
Known karst	0	0	502	598	600	558
Possible karst	0	0	2,324	1,472	2,191	2,463
Total	0	0	3,205	2,297	3,148	3,402

Analysis of the alternatives indicates that approximately 5,000 acres of units and associated roads are in areas of known and possible karst. These areas are designated for intensive survey. It is anticipated that an additional 1,000 acres not affected by project activities will also be surveyed within the Project Area. This additional survey is needed to create a more detailed geologic map of the Project Area. Specific units in known and possible karst areas, and the alternatives they are proposed to be used in, are shown in Table 3-66, in the Cultural section of this chapter.

Before the Final EIS is published, the Forest Service Area Geologist, District Cave Management Specialist, and the Karst Inventory Contractors will have investigated all the known karst areas and the possible karst areas where limestone and/or marble formations are found. These surveys should identify any specific cave resources that may be affected by the proposed activities, and propose appropriate mitigation measurees. Mitigation is discussed in Chapter 2.

VISUAL RESOURCES

Key Terms

Background - the distant part of a landscape; the seen, or viewed, area located from 3–5 miles to infinity from the viewer
Existing Visual Condition (EVC) - the level of visual quality or condition presently occurring on the ground
Foreground - portion of viewed area from immediately adjacent to viewing position out to about a half mile from observer position; individual branches of trees are discernible
Future Visual Condition (FVC) - the level of visual quality or condition occurring on the ground at the end of the proposed harvest period
Maximum Modification - a visual quality objective which prescribes that an area may be dominated by management activities, but resulting visual characteristics should appear as a natural occurrence when viewed from the background distance
Middleground - the visible terrain beyond the foreground, where individual trees are still visible but do not stand out distinctly from the landscape; a half mile to 5 miles from the observer's position
Modification - a visual quality objective in which activities may visually dominate the original characteristic landscape, but resulting visual characteristics must resemble natural occurrences within the surrounding area when viewed from the middleground distance
Partial Retention - a visual quality objective in which management activities are to remain visually subordinate to the natural landscape
Preservation - a visual quality objective which permits ecological changes only; applies to wilderness areas and other special classified areas
Retention - a visual quality objective which provides for management activities that are not visually evident to the casual observer
Sensitivity Level - the measure of people's concern for scenic quality; three levels are assigned to land areas viewed from boat routes, anchorages, plane routes, roads, trails, public-use areas, and recreation cabins
Viewshed - a defined viewed landscape or panoramic vista seen from a road, marine waterway, or specific viewpoint
Visual Quality Objective (VQO) - measurable standards reflecting five different degrees of landscape alteration based on a landscape's diversity of natural features and the public's concern for high scenic quality

Introduction

Many of the landscapes visible from public travel routes in the region are susceptible to change in visual character as a result of timber harvest and road-building activities (Barker 1985).

The Visual Resource Management System (VRM), developed by the Forest Service, inventories and measures visual resources through the use of the following tools:

Visual Character Type, Landscape Variety Classes, Sensitivity Levels, and Visual Quality Objectives (VQO's).

The VRM System is a two-part analytic process. The first part assesses the relative scenic quality (Visual Character Type and Variety Class) of the Project Area as found in its current natural state. The second part assesses the sensitivity levels based on type and use of these landscapes.

Scenic quality and sensitivity ratings combined define levels of Existing Visual Condition (EVC). Each level describes a different degree of alteration of the natural landscape based upon the importance of esthetics.

Affected Environment

Visual Character Type

Visual Character Type describes a large area of land that has common characteristics of landform, rock formations, water forms, and vegetative patterns. Character types serve as frames of reference for classifying the relative scenic quality of the land's physical features; and help establish criteria for determining Variety classes.

The Tongass National Forest is made up of six distinct character types. The Project Area is located in terrain referred to as Kupreanof Lowland and Coastal Hill (USDA Forest Service 1979b), separated by a line running diagonally from near the community of Klawock northeasterly to Luck Lake on the east coast. The Kupreanof Lowland character type, north of this boundary, comprises 54 percent of the Project Area; the Coastal Hill type, to the south, amounts to 46 percent.

Kupreanof Lowland

The Kupreanof Lowland visual character type encompasses the central portion of the Inside Passage, including the Wrangell Narrows; Chatham, Sumner, and Stikine straits; Duncan Canal; Salmon Bay Lake; and Frederick Sound. The area is made up of islands with rolling terrain and topographical relief varying from 300 to 1,500 feet, and separated by an intricate network of waterways. Mountains are scattered and block-like, rising to 3,500 feet above the lowlands. The shoreline is made up of many small bays, rock reefs, and occasional small gravel beaches. The hemlock/spruce forest dominates this character type, except for areas of higher elevations where alpine ecosystems are present.

Coastal Hill

The southern reaches of the Tongass are represented by the Coastal Hill visual character type, whose islands offer an extensive landform variety with elevations ranging from 1,000 to 4,500 feet. Areas with elevations less than 3,500 feet were glaciated and have rounded hummocky summits, knobs, and ridges. Generally, steep landforms to saltwater and an irregular rounded appearance are characteristic. Few streams are more than 10 miles long, but they are steep, and offer rapids, cascades, pools, etc. Dense conifer cover is prevalent, with some large areas of muskeg at higher elevations.

Scenic Quality

Having defined the area's character type, the next step in the landscape analysis process assesses the relative scenic quality of all landscapes in the Project Area as they are found in their natural state. These landscapes are rated as having either distinctive, average, or low scenic quality (Variety Class A, B and C, respectively). These ratings are based on the degree of diversity in the physical features and are rated relative to the overall character of the larger region, or Visual Character Types.

Distinctive (Variety Class A) landscapes in the Project Area comprise 3 percent and are primarily located in the riparian lowlands near saltwater. The majority of landscapes within CPOW are Average (Variety Class B) - 88 percent; Low scenic (Variety Class C) landscapes comprise 9 percent.

Sensitivity Levels

The third part of the landscape inventory analysis identifies recreation use areas, communities, travel routes (marine and land), anchorages and cabins, and their associated viewsheds, based on the type of users, their concern for scenic quality, and frequency of use. These range from Sensitivity Level I to Level III.

A Sensitivity Level I is assigned to important viewsheds that are frequently viewed, particularly those associated with heavily used recreation areas and major marine travel routes. On the Project Area this would include the ferry and cruiseship routes, the Thorne Bay–Sandy Beach Rd., the small campsites along the road system, the recreation cabins, and the day-use sites. Sensitivity Level II is assigned to moderately significant use areas, such as less frequently used boat routes, roads, anchorages, saltwater fishing areas and their viewsheds. On the CPOW Project Area this would include the main road system north of Control Lake and parts of El Cap Pass. Sensitivity Level III applies to all land areas not seen from any of the Level I or II use areas.

Visual Quality Objectives (VQO's)

VQO's are a set of measurable levels of change to the natural landscape character. They are "benchmark" statements of ideal management scenarios for different viewsheds. They are based on the visual resource values of landscape variety, sensitivity levels, and distance zones.

They include Preservation (P), Retention (R), Partial Retention (PR), Modification (M), and Maximum Modification (MM), and are defined in the Glossary under Visual Quality Objectives.

The TLMP Draft Revision (1991a) provides specific visual standards and guidelines for timber harvest activities, by VQO.

Proposed Visual Quality Objectives (VQO's)

For this project, VQO's have been established using as a starting point the most current information from the TLMP Draft Revision Alt. P (1991a), and then adjusted to reflect more specific management direction. These VQO's are summarized in Table 3-59, and represent the standards for all visual quality analysis with this document.

Table 3-59
Proposed Visual Quality Objectives (VQO), by Viewshed

Viewshed	Foreground	Middleground	Background
Summit FDR 20	MM	MM	*
Naukati Lakes FDR 20	MM	MM	*
Sarheen Cove FDR 20	MM	MM	*
Neck Lake FDR 20	MM	MM	*
Lake Ellen Road	MM	MM	*
Staney Creek Road	M	MM	*
Baird Peak	*	M	*
Ratz Harbors	*	M	M
Sal Creek	*	M	M
Thorne Bay	MM	MM	*
Whale Pass	PR	M	*
Sweetwater Lake	R/PR	PR/M	*
Hatchery Lake	R	PR	*

MM = Maximum Modification M = Modification PR = Partial Retention R = Retention
* These distance zones do not apply within these viewsheds.

Existing Visual Condition (EVC)

As part of the planning process for CPOW, a visual and site analysis has been completed. Key Project Area viewsheds were digitized from 2" = 1 mile contour maps; existing harvest areas were plotted; and computerized perspective plots were created for each sensitive viewpoint.

EVC represents the level of visual quality or condition presently occurring on the ground. It is measured in terms of condition types I, II, III, IV, V, and VI. An EVC analysis serves as a tool for estimating the cumulative effects of alternatives, and as a historical record of the degree and amount of physical alteration of the landscape over time and space. Acres of each EVC type are presented in Figure 3-26.

Type I Areas in which only ecological change has taken place. **Natural Condition.**

Type II Areas in which changes in the landscape are not noticed by the average forest visitor unless pointed out. **Natural appearing.**

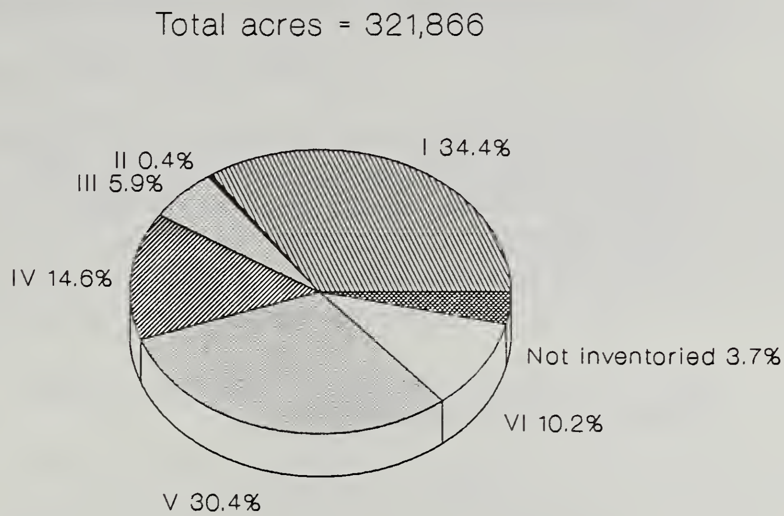
Type III Areas in which changes in the landscape are noticed, but do not attract attention. **Slightly altered.**

Type IV Areas in which changes in the landscape are easily noticed and may attract attention. **Moderately altered.**

Type V Areas in which changes in the landscape obviously appear to be major disturbances and stand out as a dominating impression of the landscape. **Heavily altered.**

Type VI Areas in which changes in the landscape are in glaring contrast to the natural appearance. **Drastically altered.**

Figure 3-26
Acres of Each EVC Type in the Project Area



The EVC inventory as used in this document provides a baseline that: 1) compares a viewshed's actual condition (degree of alteration) with the proposed VQO's, 2) assesses the cumulative visual impacts of alternatives, and 3) determines whether the proposed management activities and facilities will maintain the present conditions, lower the visual quality, and meet or not meet the proposed VQO's.

Project Area Viewsheds: General

Viewsheds differ from watersheds or VCU's in that their boundaries are defined only by visually seen areas. The most sensitive viewing position along Clarence Strait is from the Alaska Ferry and cruiseship route which varies from one-half to three miles off the Prince-of-Wales coast (middleground); along the West Coast Waterway—anywhere from a few hundred yards to a mile off shore (foreground to near middleground); along the mainline roads and from recreation sites—from the observer position to two or three miles (immediate foreground to middleground).

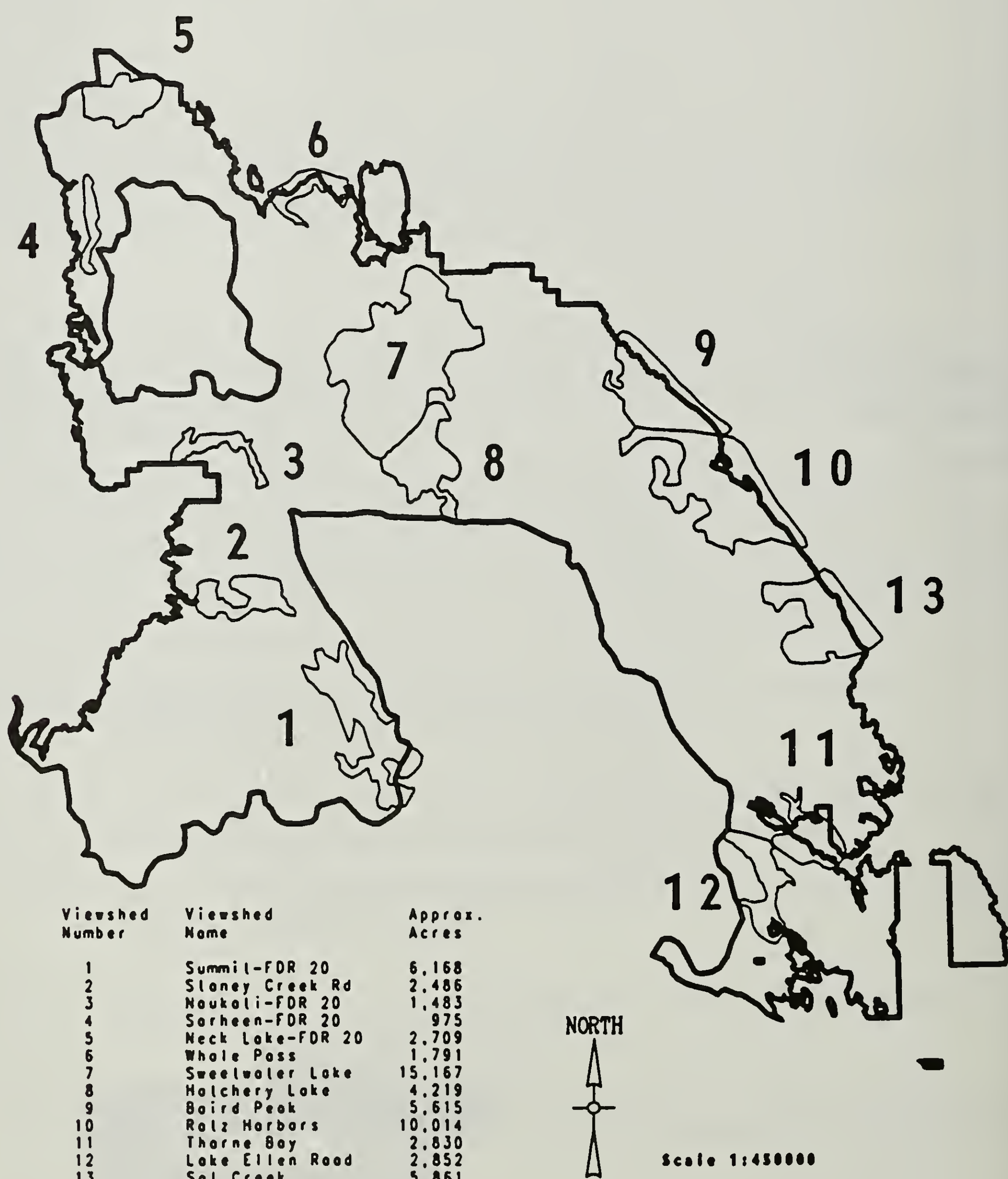
To assess the visual impacts of the different alternatives in relation to the proposed VQO's, a set of key sensitive viewsheds has been identified. These are divided into three categories based on their present visual condition: 1) heavily altered (EVC V-VI), 2) moderately altered (EVC III-IV), and 3) slightly altered (EVC II) viewsheds.

Table 3-60 lists the viewshed number and name by category. Locations of key viewsheds are shown in Figure 3-27.

Table 3-60
Project Area Viewsheds, by Viewshed Number and Name

Heavily Altered	Moderately Altered	Slightly Altered
1. Summit-FDR 20	5. Neck Lake-FDR 20	4. Sarheen-FDR 20
2. Staney Creek Road	7. Sweetwater Lake	6. Whale Pass
3. Naukati-FDR 20	8. Hatchery Lake	9. Baird Peak
10. Ratz Harbors	11. Thorne Bay	
12. Lake Ellen Road	13. Sal Creek	

Figure 3-27
CPOW Viewshed Location Map



Sensitive Viewsheds

Part of the analysis process identified the specific travel routes and use areas from which the VQO's are applied. These routes and areas were developed with input from the Forest and Thorne Bay District, and are based on the use areas identified in the Forest's visual resource inventory.

The following discussion will describe the sensitive viewsheds in relation to location in the Project Area, landscape or terrain character, and an assessment of whether the present condition now meets the proposed VQO's. Viewshed size includes both seen and unseen areas. The discussion order is geographically from the southwest, north to Neck Lake, east to the Honker Divide complex, and finally south to the Thorne Bay area (see Key Viewshed Location Map, Figure 3-27).

1. Mainline 20 Road - Summit Viewshed

This road corridor viewshed (5,870 acres) in VCU 588 and a portion of VCU 590 is located approximately three miles north of the Control Lake junction of Forest Road 20 and Forest Road 30 (Klawock to Thorne Bay Rd.). This route is the only one connecting southern Prince of Wales (POW) communities with the Coffman Cove and Whale Pass communities in the north. The VQO's are Maximum Modification in the foreground (2,792 acres) and middleground (3,078 acres). Its landscape character consists of a narrow (one mile wide), deep (1,400 to 2,000 feet), long canyon (five miles), and a flat valley floor with steeped-sided slopes rising to rounded ridges.

Existing Visual Condition. The Existing Visual Condition (EVC) of this viewshed is heavily altered (V). Since the early 1970's extensive harvest activities (2,336 acres) have occurred, with the remaining forested areas randomly located near the road and along the ridgetops. The viewshed at this time meets the VQO of Maximum Modification.

2. Staney Creek Road Viewshed

This road corridor viewshed (2,486 acres) in VCU 588 is located four miles south of the Forest Road 20 and Forest Road 30 junction. It takes off from the Forest Road 20 and heads west to the mouth of Staney Creek and it recreation cabin. The VQO's are Modification (800 acres) and Maximum Modification (1,086 acres) in the fore and middleground, respectively. The landscape character consists of two 1,000-foot mountains, with steep-sided slopes, rising to the north of the road. To the southwest, the 2,600-foot Twin Mountain complex exposes a steep, heavily forested escarpment to viewers along the road.

Existing Visual Condition. The Existing Visual Condition of this viewshed, heavily altered (V), reflects extensive harvesting (1,817 acres) in the mid 1970's. The regenerating forest is nearing 20–30 feet in height with a few areas, namely the mountaintops and distant ridges, covered with old-growth forest. Since much of this area is unseen, views created with the original clearcuts are limited now to the road right-of-way corridor and far middleground ridgetops. Because of the current height of regeneration, the viewshed now meets the VQO's.

3. Mainline 20 Road - Naukati Lakes Viewshed

This road corridor viewshed (1,484 acres) in VCU 571 is located one mile north of the junction of Forest Roads 20 and 30, and is broken into two parts: Area A is

a sub-viewshed of the corridor east of Naukati Lakes and Area B is west of the lakes. The VQO is Maximum Modification (1,484 acres) in the foreground. The landscape character of this road corridor is that of rolling 200-400 foot terrain interspersed with lakes and muskegs. The viewshed primarily consists of limited foreground views (less than 1/2 mile) into forested stands interspersed with occasional recent clearcuts alongside the road.

Existing Visual Condition. The Existing Visual Condition ranges from slightly altered (III) in Part A to moderately altered (IV) in Part B; harvested areas amount to 345 acres. The viewshed meets the VQO of Maximum Modification in the foreground.

4. Mainline 20 Road - Sarheen Viewshed

This road corridor viewshed (975 acres) in southern VCU 549 and northern VCU 554 is located three miles north of Sarkar Cove and three miles south of Neck Lake on Forest Road 20. The VQO is Maximum Modification in the foreground and middleground. The landscape character of this area is that of typical Kupreanof Lowland character type—rolling topography of low knobs and ridges less than 800-1,000 feet, with numerous interspersed lakes and muskegs. Limited foreground and distant (four miles or more) middleground views predominate.

Existing Visual Condition. The Existing Visual Condition ranges from natural-appearing (II) to heavily altered (V). The southern half of this viewshed (in VCU 554) was harvested (206 acres) as recently as 1980 and straddles the road. The northern half has not been harvested. Both the northern and southern portions of this viewshed meet the VQO of Maximum Modification.

5. Mainline 20 Road - Neck Lake Viewshed

This road corridor viewshed (1,560 acres) in VCU 550 is located around the middle and western portions of Neck Lake. Forest Roads 20 and 25 follow the southern shoreline. Neck Lake and its surrounding shoreline is very visible to both the and lake users. The VQO's are Maximum Modification in the foreground (1,476 acres) and middleground (84 acres). The heavily wooded terrain forms a steep, even- sloped backdrop on the north shore of the lake below an east-west oriented 1,200-foot mountain.

Existing Visual Condition. The Existing Visual Condition of the viewshed ranges from natural appearing (II) to moderately altered (IV) on the north shore; the south shore appears as heavily altered (V) reflecting extensive harvest (926 acres) beginning in 1966 along the roads. The regenerating forest is nearing 20 to 30 feet in height. This limits foreground views created within the original clearcuts to the road right-of-way corridor, although middleground views are found from vista points on Neck Lake's western slopes above the shoreline. The viewshed meets the VQO of Maximum Modificaticn in the foreground and middleground.

6. Whale Pass Viewshed

This saltwater viewshed (704 acres) in VCU 551 and northern VCU 552 is located along the south shoreline of Whale Passage from its entrance between Thorne Island and Stevenson Island in the east to the Mabel Island area on the west. The VQO's are Partial Retention (604 acres) in the foreground and Modification

(100 acres) in the middleground. Whale Pass provides access to the community of Whale Pass and recreational activities on Barnes Lake, Sweetwater Lake and Hatchery Lake to the south. The landscape character is composed primarily of foreground (0 to 1/2 mile) shoreline views of low elevation (200 to 600 feet) ridges and knobs. In other areas steep uniformly forested slopes extend to saltwater.

Existing Visual Condition. The Existing Visual Condition of this viewshed is slightly altered (III). This results from small entries along the shoreline (83 acres) logged by A-frame in the early 1960's. The regenerating forest is nearing 30 to 40 feet in height, its green color is deepening, the canopy beginning to close, and its texture beginning to diversify. The viewshed at this time meets the VQO's of Partial Retention and Modification.

7. Sweetwater Lake Viewshed

This freshwater lake viewshed (13,637 acres) is located three to four miles southwest of the community of Coffman Cove in VCU 573 and VCU 577. Sweetwater Lake with its Forest Service cabin is a high-use recreational area. Views from the cabin have a VQO of Retention in the foreground and Partial Retention in the middleground. Views from the lake proper have a VQO of Partial Retention in the foreground and Modification in the middleground. The landscape character consists of the steep mid-slopes and rounded 1,200-foot ridgetops to the west (as seen from the cabin). To the east and west (as seen from a boater's perspective), steep-sided slopes rise to nearly 2,000 feet above this lake. Forest Road 30 is located alongside the lake's eastern edge (unseen from the lake).

Existing Visual Condition. The Existing Visual Condition of this viewshed varies depending on viewpoint and view direction. Previous harvest activities in this viewshed have taken place on the lower slopes, with most acreage unseen from the lake and cabin. From the lake, views to the west appear as slightly altered (III), while to the east, the heavily vegetated slopes are natural appearing (II). The view to the north is slightly altered (III). To the south, in the far middleground (4 miles), the view appears as moderately altered (IV). At this time the viewshed meets the proposed VQO's from the cabin and from the rest of the lake.

8. Hatchery Lake Viewshed

This freshwater lake viewshed (3,648 acres) is located three miles south of Sweetwater Lake in VCU 574. This lake and creek are part of the Honker Divide Canoe Route. Views from the lake and its 1/4 mile buffer have a VQO of Retention in the foreground and Partial Retention in the middleground. The landscape character as seen from the lake consists of steep mid-slopes and rounded 1,000-foot mountaintops to the west; steep-sided slopes rise to nearly 1,600 feet on the east and southeast.

Existing Visual Condition. The Existing Visual Condition of this viewshed, is heavily altered (IV) on the eastern slopes and moderately altered around other parts of the lake. This reflects extensive recent harvest (809 acres) (1980) in the middleground views. The regenerating forest has only attained 5 to 10 feet height and still appears as recent clearcuts because slash is still exposed and there are distinctive contrasts with naturally occurring openings and lines in the landscape. Because of previous harvesting, at this time this viewshed does not meet the proposed VQO's of Retention and Partial Retention.

9. Baird Peak Viewshed

This saltwater viewshed (3,944 acres) in VCU 582 is located along Clarence Strait on the east coast of the Project Area. This marine travel route is used by the State ferries and many cruiseships. Their routes vary anywhere from one-half to three or four miles offshore. The VQO is Modification in the middleground (3,944 acres). The landscape character consists of heavily vegetated, moderately steep slopes, rising to an approximately 1,400-foot plateau, then quickly rising to nearly 3,000 feet in the southern part of this viewshed. In the north, the highest area is a 1,200-foot plateau.

Existing Visual Condition. The Existing Visual Condition of this viewshed appears in natural condition (I) to slightly altered (III) due to only 107 acres having been harvested in 1969 in the northern part. At this time, the viewshed meets the VQO of Modification.

10. Ratz Harbors Viewshed

This saltwater viewshed (4,623 acres) in VCU 583 and the northern portion of VCU 584 is located immediately south of Baird Peak along Clarence Strait. These harbors and valleys are seen as middleground and background from the marine travel route. The VQO is Modification (4,485 acres) in the middleground. The background landscape character is defined by two 1,000- to 1,300-foot ridges oriented more or less perpendicular to the coastline and harbor area. The steep mid-slopes and sharply defined ridgetops form dramatic, though oblique, backdrops as seen from the ferry or cruiseship route.

Existing Visual Condition. The Existing Visual Condition of this viewshed ranges from moderately altered (IV) to heavily altered (V). Although most of the previous harvest (2,625 acres) in this viewshed was in the early to mid-1960s, it was confined to the lower valleys and oblique slopes in low visibility areas as seen from the Travel Route. This regenerating forest is nearing 25 to 30 feet in height. Recently, however, harvest has taken place on steep middlegound slopes directly facing the viewing areas. At this time the viewshed meets the VQO in the Little Ratz area. Because of previous harvesting, it does not meet the VQO of Modification in the Big Ratz Harbor area. However, it does meet the VQO of Maximum Modification.

11. Thorne Bay Viewshed

This saltwater viewshed (2,830 acres) in VCU 586 is located on the ridges above the town of Thorne Bay. Thorne Bay will be managed for Maximum Modification in the foreground and middleground. This viewshed, looking to the northwest from saltwater, is viewed as middleground (1/2 to two miles). The landscape character consists of low to moderate hills rising steeply from saltwater to 600 feet above Thorne Bay (one mile wide by three miles long).

Existing Visual Condition. The Existing Visual Condition of the middleground slopes is in a slightly altered (III) condition. Although not in this viewshed, extensive past harvest is in evidence on the slopes across the bay to the south. At this time the viewshed meets the VQO of Maximum Modification.

12. **Lake Ellen Road Viewshed**

This road corridor viewshed (2,508 acres) in VCU 598 is located three to four miles southwest of Thorne Bay and connects Mainline 30 Road (Thorne Bay Rd.) to the Lake No. 3 campground. The slopes above the road are seen as both foreground and middleground have a VQO of Maximum Modification (2,508 acres) in the foreground and middleground. The landscape character consists of moderately steep slopes rising 600 to 700 feet above the road across a small valley. The ridge parallels the road in a southeast to northwest direction for approximately three miles.

Existing Visual Condition. The Existing Visual Condition is heavily altered (V) due to extensive harvest since the early 1970's. Nearly 42 percent (1,055 acres) of this viewshed is visibily altered, along both sides of the road and the entire lower half of the slopes opposite the road. At this time, the viewshed meets the VQO of Maximum Modification.

13. **Sal Creek Viewshed**

This saltwater viewshed (3,513 acres) in VCU 584 is located south of the Ratz Harbor viewsheds along Clarence Strait. This valley and its slopes are seen as middle and background from this marine travel route. The VQO is Modification. The landscape character is defined by a combination of 1,200–1,400-foot steep-sided slopes above an east-west oriented valley, and a high adjoining ridge running north-south, paralleling the coast.

Existing Visual Condition. The existing visual condition of this viewshed is moderately altered (IV). Most of the previous harvest occurred in the mid 1960's. This regenerating forest is nearing 25–30 feet in height. Recently, however, harvest has taken place near the coastline on prominent knobs and ridges. At this time the viewshed does meet the VQO of Modification.

Effects of the Alternatives

Direct and Indirect Effects

The direct and indirect effects of alternative timber harvest proposals have been analyzed with respect to the 13 identified sensitive viewsheds described in the previous section. At this time all proposed timber harvest units will meet the VQO's proposed for this project.

Alternatives 1 and 1a are the no-action alternatives for this EIS and reflect existing site conditions. The discussion order is geographically from the southwest, north to Neck Lake, east to the Honker Divide complex, then south to the Thorne Bay area (see Key Viewshed Location Map, Figure 3-27).

1. Mainline 20 Road - Summit

The VQO's are Maximum Modification in the foreground and middleground.

Alternatives 1 and 1a

The Existing Visual Condition (EVC) of this road corridor viewshed is heavily altered (V). The Future Visual Condition for this viewshed would remain the same except for continuing change in tree height, color and texture.

Alternative 2

Units 588-269 and 588-270 together will meet the Maximum Modification VQO for middleground views. Harvesting these two units would improve the scenic quality by removing the last forested "carrot-top" areas along the west ridgecrest creating a naturalistic "alpine" opening. All other units in VCU 588 and VCU 590 as seen within this viewshed will meet the VQO's. The Future Visual Condition would remain heavily altered (V).

Alternative 3

Units 588-268 and 588-269 together will meet the Maximum Modification VQO for middleground views. Harvesting these two units would improve the scenic quality by removing the last forested "carrot-top" areas along the west ridgecrest creating a naturalistic "alpine" opening. Under this alternative there would not be any other units or roads proposed in this viewshed. The Future Visual Condition would remain heavily altered (V).

Alternative 4

All units in VCU 588 and VCU 590 as seen within this viewshed will meet the VQO's. The Future Visual Condition would remain heavily altered (V).

Alternative 5

All units in VCU 588 and VCU 590 as seen within this viewshed will meet the VQO's. The Future Visual Condition would remain heavily altered (V).

2. Staney Creek Road Viewshed

The VQO's are Modification in the foreground, Maximum Modification in the middleground.

Alternatives 1 and 1a

The Existing Visual Condition of this road corridor viewshed is heavily altered (V). The Future Visual Condition would remain the same except for a change in tree height, color and texture.

Alternatives 2 and 5

Because of topographical and second-growth screening in the foreground, all units will meet the VQO's. Although Units 588-322 and 588-327 are larger than the maximum size of 100 acres for middleground views (by 30 and 17 seen

acres respectively), they will meet the Maximum Modification VQO, because of the shallow angle or obliqueness of seen acres to the viewer. In addition, the harvesting of Unit 588-322, would improve the scenic quality by replacing the "carrot-top" appearance with a smoother form and line. The Future Visual Condition would remain heavily altered (V).

Alternative 3

Because of topographical and second-growth screening in the foreground, all units will meet the VQO's. Proposed roads are unseen or located in areas with low visibility and will not negatively affect the VQO's. Although Unit 588-324 is larger (by 9 seen acres) than the maximum size of 100 acres, only 95 acres are obliquely seen, thereby reducing visual impacts. The Future Visual Condition would remain heavily altered (V).

Alternative 4

Because of topographical and second-growth screening in the foreground, all units will meet the VQO's. Proposed roads are unseen or located in areas with low visibility, and will not negatively affect the VQO's. The Future Visual Condition would remain heavily altered (V).

3. Mainline 20 Road - Naukati Lakes Viewshed

The Visual Quality Objectives are Maximum Modification in the foreground and middleground.

Alternatives 1 and 1a

The Existing Visual Condition along this road corridor viewshed ranges from slightly altered (III) to moderately altered (IV). The Future Visual Condition would remain the same except for continuing change in tree height, color and texture.

Alternative 2, 4, 5

All proposed units and roads should meet the VQO's. The Future Visual Condition would be heavily altered (V).

Alternative 3

There would be no units or roads proposed under this alternative. The Future Visual Condition would remain the same as Alternative 2 except for continuing change in tree height, color and texture.

4. Mainline 20 Road - Sarheen Viewshed

The VQO's are Maximum Modification in the foreground and middleground.

Alternatives 1 and 1a

The Existing Visual Condition of this road corridor viewshed ranges from naturally appearing (II) to heavily altered (V). The Future Visual Condition would remain unchanged, except for changes in tree height, color and texture.

Alternatives 2, 3, 4

The Future Visual Condition would be moderately altered (IV).

Alternative 5

The Future Visual Condition would be heavily altered (V).

5. Mainline 20 Road - Neck Lake Viewshed

The Visual Quality Objectives are Maximum Modification in the foreground and middleground.

Alternatives 1 and 1a

The Existing Visual Condition of this road corridor viewshed ranges from natural appearing (II) to moderately altered (IV) on the north shore; the south shore appears as heavily altered (V). The Future Visual Condition would remain the same, except for a change in tree height, color and texture.

Alternatives 2, 3 and 4

Proposed roads with mid-slope locations may create some contrasting line effects, but will not negatively affect VQO's. The Future Visual Condition would remain from naturally appearing (II) to heavily altered (V).

Alternative 5

Under this alternative, there would not be harvest units or new roads proposed in this viewshed. The Future Visual Condition would remain the same as Alternatives 1 and 1a, except for changes in tree height, color, and texture.

6. Whale Pass Viewshed

The VQO's are Partial Retention in the foreground and Modification in the middleground.

Alternatives 1 and 1a

The Existing Visual Condition of this saltwater viewshed is slightly altered (III). The Future Visual Condition would remain the same, except for continuing change in tree height, color and texture.

Alternatives 2 and 5

Under these alternatives, there would not be harvest units or new roads proposed. The Future Visual Condition would remain the same as Alternatives 1 and 1a except for continuing change in tree height, color and texture.

Alternative 3

Unit 551-254 will meet the VQO of Partial Retention in the foreground with a modification in its planned boundary. This change will either be a reduction in size (to less than 20 seen acres), or a change in shape (undulating or feathered

edges). Although Unit 552-201 is larger (by 14 seen acres) than the suggested 10 acres for foreground steep mid-slopes, it would meet the Partial Retention VQO due to the screening effect of the beach fringe buffer. All other units in VCU 551 and VCU 552 as seen within this viewshed should meet the VQO's. The Future Visual Condition would be moderately altered (IV).

Alternative 4

Under this alternative, the visual effects would be the same as those described under Alternative 3. In addition, Unit 551-249 would be slightly larger (by 6 seen acres) than the suggested 10 acres for foreground views. This unit would meet the Partial Retention VQO due to the screening effect of the beach fringe buffer. The Future Visual Condition would be moderately altered (IV).

7. Sweetwater Lake Viewshed

The VQO's for views from the Forest cabin use area are Retention in the foreground and Partial Retention in the middleground. The VQO's as seen from the lake are Partial Retention in the foreground and Modification in the middleground (mid to upper slopes).

Alternatives 1 and 1a

The Existing Visual Condition of this freshwater lake viewshed varies from natural appearing (II) to moderately altered (IV). The Future Visual Condition would remain the same except for the continuing change in tree height, color and texture.

Alternatives 2 and 5

Under these alternatives, all proposed units and roads will meet the VQO's due to topographical and lake buffer screening in the foreground. The Future Visual Condition would remain the same except for continuing change in tree height, color and texture.

Alternatives 3 and 4

Unit 577-317 is located on the western slopes and is larger (by 10 seen acres) than the maximum size of 40 acres for middleground and less than 35 percent slopes, but will meet the Partial Retention VQO due to the obliqueness or tilted aspect to the viewer from the lake. Because of topographical and lake buffer screening in the foreground, all other proposed units and roads will meet the VQO's. The Future Visual Condition would be moderately altered (IV).

8. Hatchery Lake Viewshed

The VQO'S are Retention in the foreground, Partial Retention in the middleground.

Alternatives 1 and 1a

The Existing Visual Condition of this freshwater lake viewshed is moderately altered (IV). The Future Visual Condition would remain the same except for the continuing change in tree height, color and texture.

Alternatives 2, 4 and 5

Under these alternatives, there would not be harvest units or new roads proposed in this viewshed. The Future Visual Condition would remain the same as Alternatives 1 and 1a, except for continuing change in tree height, color and texture.

Alternative 3

Units 574-239 and 574-228 have been prescribed for partial cut harvest to meet the Partial Retention VQO. Because of topographical and lake buffer screening in the foreground, all other units in this alternative will meet the VQO's. Proposed roads are unseen or located in areas with low visibility and will not negatively affect the VQO's. The Future Visual Condition would be moderately altered (IV).

9. Baird Peak Viewshed

The VQO is Modification in the middleground.

Alternatives 1 and 1a

The Existing Visual Condition of this saltwater viewshed appears from natural condition (I) to slightly altered (III). The Future Visual Condition would remain the same except for continuing change in tree height, color and texture.

Alternative 2

Unit 582-215 will meet the VQO of Modification for middleground views from ferry and cruiseship routes with a modification in its planned boundary configuration. This change will be a change in size to less than 24 seen acres and a change in shape (undulating or feathered edges). To the north, Unit 582-218 at 69 seen acres would meet the Modification VQO due to an oblique view or tilted aspect to the viewer. All other units will meet the VQO. The Future Visual Condition would be moderately altered (IV).

Alternative 3

Under this alternative, the visual effects would be the same as those described under Alternative 2. The Future Visual Condition would be moderately altered (IV).

Alternative 4

The visual effects would be the same as those described under Alternative 2, except for Unit 582-218, which is not proposed here. The Future Visual Condition would be moderately altered (IV).

Alternative 5

The Future Visual Condition would be moderately altered (IV).

10. Ratz Harbors Viewshed

The VQO is Modification in the middleground and background.

Alternatives 1 and 1a

The Existing Visual Condition of this saltwater viewshed ranges from moderately altered (IV) to heavily altered (V). The Future Visual Condition would remain the same except for continuing change in tree height, color and texture.

Alternative 2

Although Unit 584-272 in Little Ratz Harbor is substantially larger (by 51 seen acres) than the maximum size of 60 acres for middleground views, it will meet the Modification VQO due to its obliqueness or tilted aspect to the viewer and feathering the upper edges along the ridgetop to enhance its appearance as a naturally occurring opening. All other units and proposed roads should meet the VQO. The Future Visual Condition would remain from moderately altered (IV) to heavily altered (V).

Alternative 3

The visual effects would be the same as those described under Alternative 2, All other proposed units and roads are unseen or located in areas with low visibile impacts and should not negatively affect the VQO. The Future Visual Condition would remain from moderately altered (IV) to heavily altered (V).

Alternatives 4 and 5

Under these alternatives, all units proposed in this viewshed will meet the VQO. The Future Visual Condition would remain from moderately altered (IV) to heavily altered (V).

11. Thorne Bay Viewshed

The VQO is Maximum Modification in the foreground and middleground.

Alternatives 1 and 1a

The Existing Visual Condition of this saltwater viewshed above the town on middleground slopes appears as slightly altered (III). The Future Visual Condition will remain the same except for continuing change in tree height, color and texture.

Alternative 2

All units and proposed roads in this alternative would meet the the VQO. The Future Visual Condition would be moderately altered (IV).

Alternatives 2, 3, 4, and 5

The visual effects would be the same as those described under Alternative 2. All other proposed units and roads are unseen or located in areas with low visible impacts and would meet the the VQO. The Future Visual Condition would be moderately altered (IV).

12. Lake Ellen Road Viewshed

The Visual Quality Objective is Maximum Modification in the foreground and middleground.

Alternatives 1 and 1a

The Existing Visual Condition of this road corridor viewshed is heavily altered (V). The Future Visual Condition and landscape mosaic would remain the same except for continuing change in tree height, color, and textures.

Alternatives 2, 4 and 5

All units and roads will meet the VQO. The Future Visual Condition of this viewshed would be heavily altered (V).

Alternative 3

The visual impacts would be the same as described in Alternative 2. All other proposed units and roads are unseen or located in areas with low visible impacts and will meet the VQO. The Future Visual Condition of this viewshed would be heavily altered (V).

13. Sal Creek Viewshed

The VQO is Modification in the middle and background.

Alternatives 1 and 1a

The Existing Visual Condition of this saltwater viewshed ranges from moderately altered (IV) to heavily altered (V). The Future Visual Condition would remain the same except for continuing change in tree height, color, and texture.

Alternatives 2 through 5

All units proposed in these alternatives would meet the VQO. The Future Visual Condition would be heavily altered (V).

Summary of Direct and Indirect Effects

Some of the proposed harvest units are larger than the recommended maximum unit size. These units have been determined to be nonetheless in compliance with the prescribed VQO's due to: (1) the positive effects of screening by topography and/or vegetation, (2) the obliqueness or tilted aspect of the harvest units to the viewer, or (3) the forms and lines of harvest unit boundaries matched the existing character of the landscape.

Two units have been prescribed for partial cut harvest in order to meet the prescribed VQO's. Because of the physical limitations of cable yarding, partial cut harvest will consist of expansion of prescribed stream-course buffers, modification of upper and lower backlines, as well as group selection. Where the proposed yarding system is helicopter, there is more flexibility in distributing leave trees and islands throughout the unit. These treatments are necessary because conventional clearcut harvest would not meet the prescribed VQO. These units include:

Unit	Alternative	Yarding method
574-228	3	Skyline
574-239	3	Helicopter

In addition, there are two units whose resulting visual condition, if harvested by clearcutting, would not meet the prescribed VQO. Due to topographic restrictions, they are not conducive to partial cut techniques in their present size or configuration. The boundary configuration of these units will be altered to meet the prescribed VQO.

Unit	Alternatives
551-254	3 4
582-215	2 3 4

Cumulative Effects

The potential for visual impact is strongest immediately after timber is harvested. In the foreground (up to 1/2 mile), stumps and debris are dominant. Activities such as cut-and-fill slopes, rock pits, and turnouts would be easily seen. As viewed in the middleground (1/2 mile to 4 miles), vivid distinction in texture, line and color of the mature forest and the harvest unit would be apparent. Exposed trunks and limbs of the new edges would dominate the visual setting.

By the fifth year of regeneration, the new forest would be filling out with low-lying vegetation (berry bushes, ferns, etc.). In some cases on poor and disturbed mineral soils, young red alder (low elevations) or Sitka alder (high elevations) would be present. In the foreground, the visual effects of the clearcut would be evident, but the shrubby vegetation and young trees would begin to cover over the stumps and exposed ground. In the middleground, the harvest unit would remain evident, with sharp contrasts in color and texture.

From year 5 to year 20, the young trees would become established, reaching a height of approximately 15 feet. Views created with the original clearcut would become limited. In the middleground, the contrasts between the new forest and mature forest would still be very obvious.

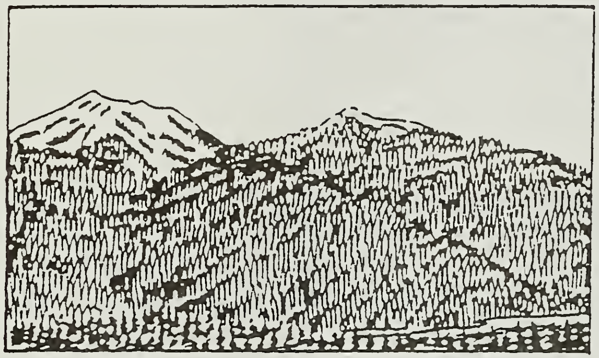
At the end of 50 years, the new forest would reach a height of approximately 50 feet. As seen in the middleground, this stand would be approximately half the height of the adjacent mature forest, providing a smoother transition at the harvest unit boundaries.

Relationship Between Visual Quality Objectives and Visual Condition

VQO Preservation

VC I Natural Condition

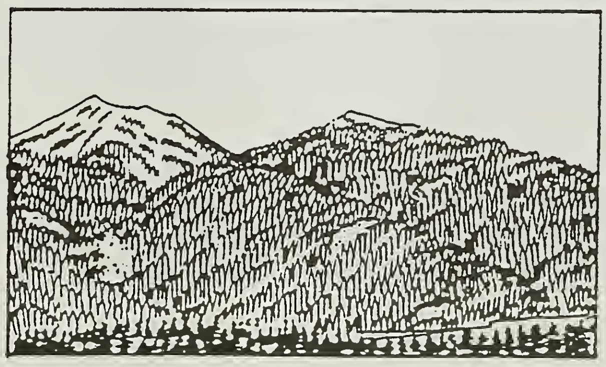
Predominately ecological changes.



VQO Retention

VC II Natural Appearing

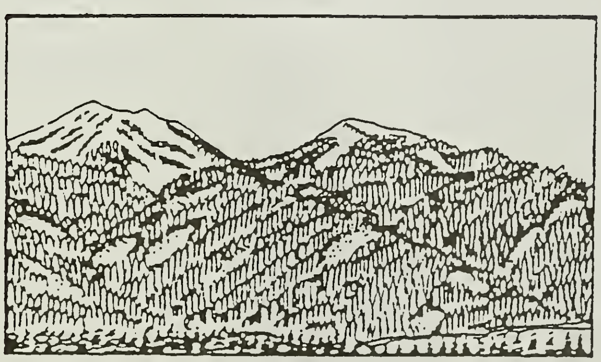
Changes are not evident.



VQO Partial Retention

VCIII Slightly Altered

Changes are noticed, but do not attract attention.

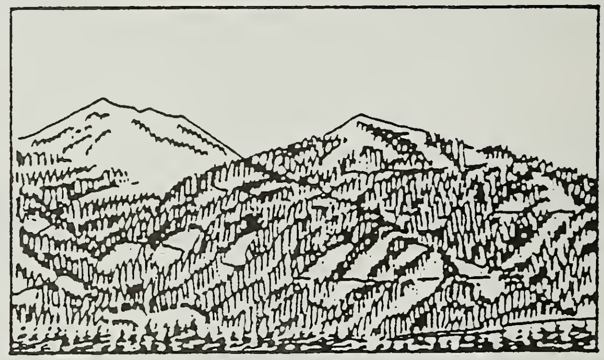


NATURAL CHARACTER DOMINATES

VQO Modification

VC IV Moderately Altered

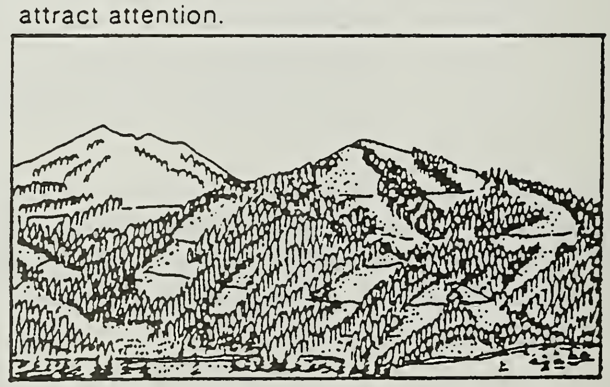
Changes are easily noticed and attract attention.



VQO Maximum Modification

VC V Heavily Altered

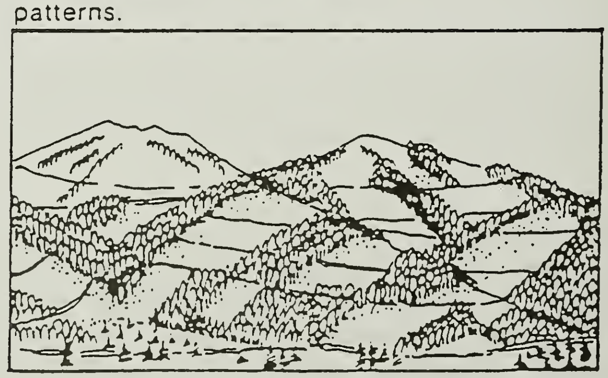
Changes are very strong and attract attention.



VQO Unacceptable Modification

VC VI Drastically Altered

Changes are in glaring contrast and disharmony with natural patterns.



ALTERED CHARACTER DOMINATES

RECREATION

Key Terms

Recreation Opportunity Spectrum (ROS) - land delineations that identify a variety of recreation experience opportunities, categorized into six classes ranging from primitive to urban
Recreation Places - identified geographical areas having one or more physical characteristics that are particularly attractive to people engaging in recreation activities (e.g., beaches, trails, cabins, campgrounds)
Roadless Area - an area of undeveloped public land within which there are no improved roads maintained for travel by means of motorized vehicles intended for highway use
Wild & Scenic River - rivers or sections of rivers designated by congressional action under the 1968 Wild and Scenic Rivers Act or by an act of the Legislature of the state of states through which they flow; may be classified or administered as wild, scenic, or recreational
Wilderness - areas designated by congressional action under the 1964 Wilderness Act or by TTRA and/or ANILCA; undeveloped federal land retaining its primeval character and influence without permanent improvements or human habitation

Affected Environment

The Tongass National Forest possesses a combination of features, including inland waterways with extensive miles of shoreline, mountains, fjords, glaciers, and populations of wildlife and fish that provide opportunities for a wide range of recreational experiences. Prince of Wales Island contains many of these features, and is unique in that recreational opportunities are more accessible by road than elsewhere in Southeast Alaska.

Past timber management activities on Prince of Wales have resulted in an extensive road system, with over 1,478 miles of road (517 within the Project Area) providing a variety of recreation opportunities which are virtually unavailable in other parts of the Tongass. The combination of roaded recreation, alpine muskegs, saltwater bays and sheltered travel corridors, interior lakes, and rivers serves to provide a large spectrum of recreation opportunities. The Alaska Marine Highway Ferry System and various air carriers make these opportunities readily available to residents of and visitors to Southeast Alaska.

Recreation Opportunity Spectrum

Recreation opportunities in the Central Prince of Wales (CPOW) Project Area have been inventoried using the Recreation Opportunity Spectrum (ROS). The ROS system portrays a range of recreation activities, settings, and experiences from primitive to urban. Opportunities in the various classes depend on a variety of factors, including: access, facilities present, amount of modification to the natural environment, and the opportunity for isolation, risk, or self reliance. A summary of the existing acreages by ROS class is displayed in Table 3-61. The CPOW Project Area currently provides approximately 62 percent of acreage in the Roaded Modified ROS class.

Table 3-61
Existing Acreages in CPOW by Recreation Opportunity Spectrum (ROS) Class

ROS Class	Acres	% of total
Semi-Primitive Non-Motorized	93,090	29
Semi-Primitive Motorized	20,080	6
Roaded Natural	6,923	2
Roaded Modified	198,680	62
Rural	2,753	1
Other	340	<1
Total	321,866	100

Recreation Demand

Recreation use on Prince of Wales Island has increased steadily in the past few years. This increase in use is associated with increased access provided by the expanding road system. Articles on these roaded opportunities have appeared in national and local publications, further increasing awareness and use. Much of this use is in the form of recreational vehicles. The proximity of the Project Area to the Alaska Marine Highway Ferry Terminal results in higher relative numbers of visitors to the Project Area.

In response to this increasing trend, recreation maps and facilities have recently been developed. Additional facilities are being considered, such as viewpoints, campgrounds, and trailheads. A recreation planning effort is ongoing for the Thorne Bay District to assist in identifying facilities and their locations. Recreation use of Prince of Wales Island is expected to continue to increase, limited at this time in part by the capacity and schedule of the ferry system.

Naturalness and remoteness associated with marine and freshwater recreation places were rated as "very important" by 80–90 percent of the recreation users of the Tongass National Forest. When asked about sensitivity to change, natural-appearing settings and solitude are the most important attributes (Clark and Johnson 1981). A sizeable number of Alaska residents indicate that they would stop going to their favorite places if development-related activities occurred on the site (Alaska Public Survey 1979). However, many Prince of Wales recreationists are there to experience roaded recreation opportunities, according to a limited, unpublished, survey of Prince of Wales Island residents.

The most popular land-based activities on the Tongass National Forest are hunting, hiking on trails, and driving for pleasure. Principal attributes of recreational settings include: access, remoteness from communities and developed sites, recreational vehicle

parking (no facilities), scenery, little used roads, and a variety of activities from which to choose (TLMP Draft Revision 1991a).

Nonresident recreation or tourism is highly dependent on meeting customer expectations, which include seeing and experiencing vast, awe-inspiring, untamed land and its wildlife (TLMP revised 1991). At the same time, visitors often lack the knowledge, ability, or equipment to safely enjoy many activities in Southeast Alaska. Attractions must be available and promoted, often through the services of outfitters and guides, to continue to provide opportunities for visitors (McDowell and Eppenbach 1985).

The most recent information available on the recreation use and preferences of local residents is the Alaska Public Survey (1979). Southeast Alaska residents highly value opportunities for remote, uncrowded outdoor recreation. Per capita participation in outdoor recreation activities is much higher in Southeast Alaska than in the Lower 48 (Alaska Public Survey 1979). Besides weather and lack of time, the most significant barrier to participating in recreation activities in 1979 was insufficient places accessible from communities. Access was especially important to those wanting to do more hunting, fishing and beachcombing. Recent discussion with recreationists and outfitter/guides has revealed that the most popular, affected and crowded areas on Prince of Wales Island are those easily accessed by roads, which implies a high demand for roaded access.

The TLMP Draft Revision (1991a) provides projections on future demand and supply of recreation opportunities in terms of ROS classes. Semi-primitive motorized ROS settings and activities popular in these settings, represent the highest current use and the fastest projected growth. Primitive and semi-primitive nonmotorized settings are the second most popular and have the second highest projected increases in demand. Roaded settings have the lowest level of use currently but are also expected to show increases in demand.

Recreation Places

A Recreation Place is identified as a geographic area having one or more physical characteristics attractive to people engaging in recreation activities. These places may be beaches, streams, trail corridors, alpine meadows, cabins, lakes, campgrounds, picnic areas, or anchorages. Each Recreation Place has some activity associated with it such as hiking, camping, hunting, canoeing, or viewing scenery or wildlife.

There are 58 Recreation Places identified within the Project Area. Figure 3-28 (map) and Table 3-62 display the Recreation Places within the Project Area, some of the features associated with the place, the ROS class, and the access method for each. Figure 3-29 (pie chart) shows the percentage of POW Recreation Places accessed by remote, marine, and roaded methods.

Figure 3-28
Map of Recreation Places in CPOW Project Area

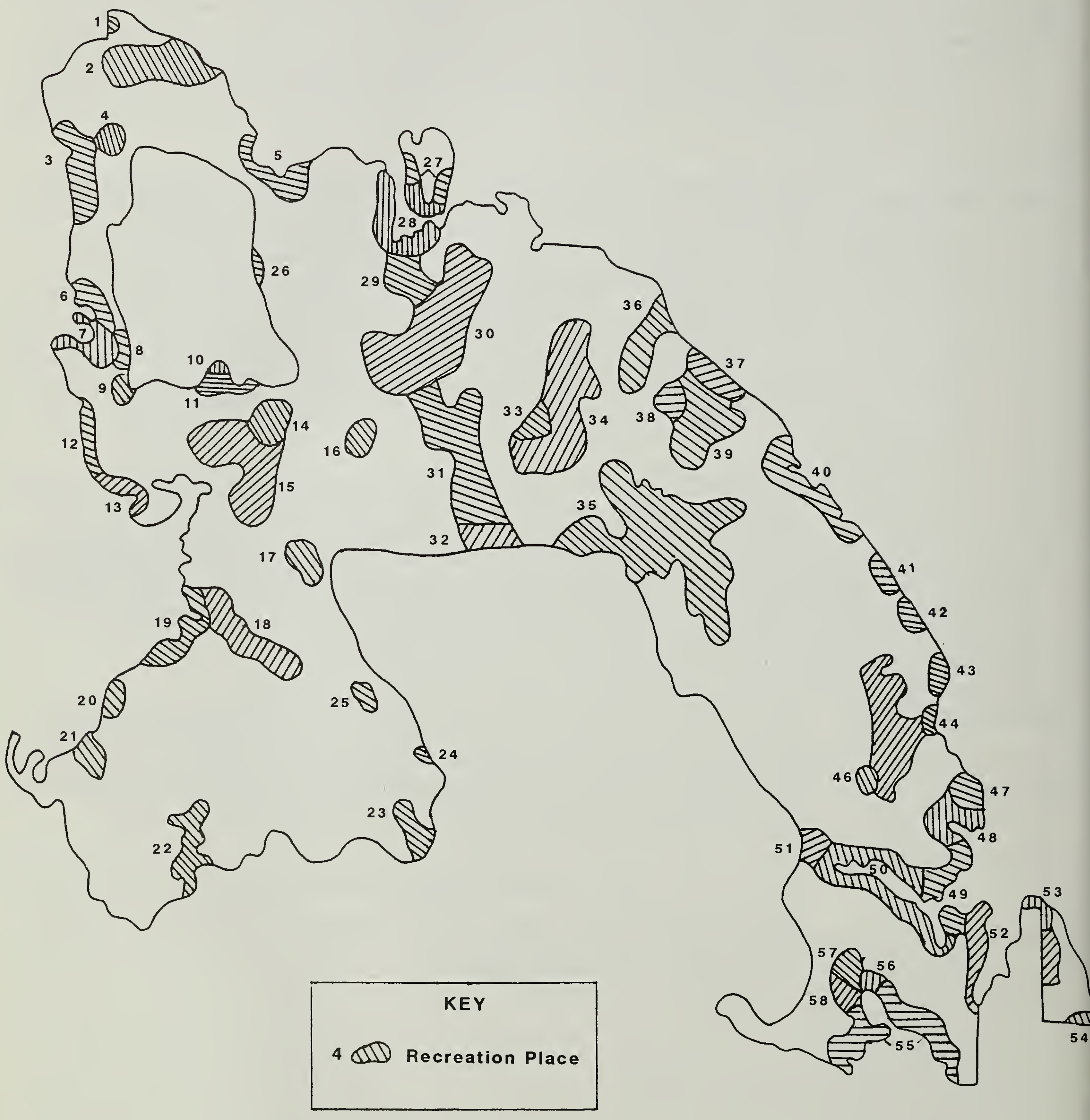
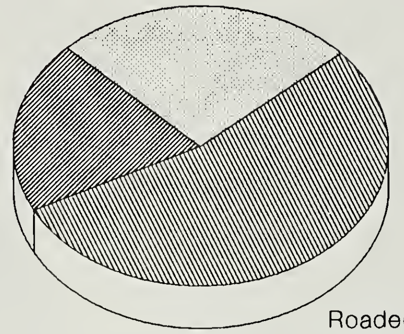


Table 3-27
Recreation Places in the CPOW Project Area

No.	Recreation Place	Features	Acres	ROS*	Access/Status*
1.	View Point, #20	Viewing,Dispersed Picnic	85	RM	Roaded/DIS
2.	Neck Lake	Boat Ramp,Hiking	2,915	RM	Roaded/P
3.	Sarheen Cove	Anchorage,Shoreline	1,432	SPM	Marine/DIS
4.	Sarheen Cove, #20	Scenery,Wildlife	461	RN	Roaded/DIS
5.	Whale Pass	Anchorage,Shoreline	1,034	SPM	Marine/DIS
6.	Salt Water Lagoon	Boating,Beach	663	RM	Roaded/DIS
7.	Sarkar Cove	Anchorages,Fishing, Beach	619	SPM	Marine/P
8.	Sarkar Creek	Hiking,Beach	166	RN	Roaded/DIS
9.	Sarkar Lake Access	Cabin,Canoe/Kayaking	132	RM	Roaded/D,DIS
10.	Upper Yatuk Creek	Canoe/Kayaking	212	SPNM	Roaded/DIS
11	Yatuk Creek	Camping	482	RM	Roaded/DIS
12.	Kassan Island	Boating,Canoe/Kayaking	709	SPM	Roaded/DIS
13.	Tuxekan Narrows	Anchorage,Boating	585	RM	Marine/DIS
14.	Naukati Lake Access	Picnic,Canoe/Kayaking	388	RM	Roaded/DIS
15.	Naukati Lake	Scenic,Hiking/Canoe/Kayak	1,914	SPNM	Roaded/DIS
16.	Log Jam Creek	Fishing	141	RM	Roaded/DIS
17.	Staney Viewing	Scenic, Wildlife Viewing	519	RM	Roaded/DIS
18.	Staney Creek	Cabin, Trail, Campsites	2,220	RM	Roaded/D,DIS
19.	Chusini Cove	Beach,Hiking,Fishing,Canoe	770	RM	Marine/DIS
20.	Winter Harbor	Boating,Canoe/Kayaking	307	RM	Marine/P,DIS
21.	Shaheen Creek	Fishing	306	RM	Roaded/DIS
22.	Kogish Mountain	Hunting	3,328	SPNM	Roaded/DIS
23.	Upper Staney Creek	Hunting	987	SPNM	Roaded/DIS
24.	Thorne Mountains	Hiking,Hunting	230	SPNM	Roaded/DIS,P
25.	Staney Meadows	Scenic,Viewing	366	RM	Roaded/DIS
26.	Mable Creek	Viewing,Canoe/Kayaking	218	P	Remote/DIS
27.	Stevenson Island	Anchorages,Boat,Canoe/Kay	908	SPM	Marine/DIS
28.	Barnes Lake	Cabin,Hunting,Scenery,Canoe	1,360	SPM	Marine/D,DIS
29.	Gold and Galligan	Boating,Canoe/Kayaking	943	SPNM	Marine/DIS
30.	Sweetwater Lake	Cabin,Fishing,Hunting	5,453	RM	Roaded/D,DIS
31.	Hatchery Lake	Canoe,Fishing,Camping	3,065	RM	Roaded/DIS
32.	Butterfly Lake	Canoe,Camping,Fishing	1,793	SPNM	Remote/DIS
33.	Trumpter Lake	Hiking,Hunting	498	RM	Roaded/DIS
34.	Trumpter Alpine	Hiking,Hunting	4,258	SPNM	Remote/DIS
35.	Manty Mountain	Hiking,Hunting	9,377	SPNM	Remote/DIS
36.	Luck Lake	Picnic,Fishing,Beach	1,668	RM	Both/D,P
37.	Clarence Strait	Beach,Dispersed Camping	722	SPM	Marine/DIS
38.	North Baird	Hiking,Hunting	622	RM	Roaded/DIS
39.	Baird Peak	Hiking,Hunting	3,158	SPNM	Roaded/DIS
40.	Ratz Harbor	Anchorages,Beach,Picnic	1,432	RM	Marine/P,DIS
41.	Short Beach	Beach,Picnic,Camping	861	RN	Marine/DIS,P
42.	Sal Creek	Beach,Fishing,Viewing	240	RN	Marine/DIS,P
43.	Narrow Point	Beach,Fishing,Picnic	230	RN	Roaded/DIS
44.	Sandy Beach	Picnic Ground,Beach,Fishing	282	RN	Roaded/D
45.	Slide Creek	Hunting	7,480	RM	Roaded/DIS
46.	Boy Scout Lake	Organization Camp,Hunting	214	RM	Roaded/DIS
47.	Forss Cove	Anchorage,Boating, Viewing	576	SPM	Marine/P,DIS
48.	Snug Anchorage	Anchorage,Boating, Viewing	1,188	SPM	Marine/P,DIS
49.	Thorne Head	Boating	558	RM	Marine/P,DIS
50.	Thorne Bay	Anchorage,Interp. ,Boating	2,738	R	Roaded/P,DIS
51.	Lower Thorne River	Campground,Fishing	254	RN	Roaded/D,DIS
52.	Tolstoi Bay	Boating,Fishing	1,156	RN	Marine/DIS
53.	Tolstoi Point	Hunting,Fishing	375	SPM	Marine/DIS
54.	Windfall Harbor	Boating	123	SPM	Marine/DIS
55.	North Karta Bay	Boating,Beach,Fishing	2,780	SPM	Marine/DIS,P
56.	Salt Chuck	Hiking,Hunting	59	RM	Roaded/D,DIS,P
57.	Lake #3	Camping,Hiking,Hunting	317	RM	Roaded/D
58.	Lake Ellen	Hiking	354	SPNM	Roaded/DIS

*KEY: RM=Roaded Modified SPM=Semi-Primitive Motorized RN=Roaded Natural SPNM=Semi-Primitive NonMotorized
P=Primitive R=Rural; D=existing developed use DIS=dispersed use P=potential developed use

Figure 3-29
Access to Recreation Places



Wild and Scenic Rivers

The Wild and Scenic Rivers Act of 1968 provides a means for recognizing and protecting the free-flowing character and the outstandingly remarkable scenic, recreation, geologic, fish and wildlife, historic, cultural, ecological, and other values of selected rivers. The Thorne River–Hatchery Creek river system is the only watercourse in the CPOW Project Area eligible for inclusion in the Wild and Scenic River system.

The Sarkar Lakes drainage has also been determined to be eligible for the Wild and Scenic River System, and is completely surrounded by the CPOW Project Area. Sarkar Lakes, however, is excluded from the Project Area, and no harvest units are proposed within the eligible river corridor. The TLMP Draft Revision (1991a) has designated this area to be managed for primitive recreation.

Eligible rivers are classified into three categories:

Wild Rivers - Those rivers or sections of rivers that are free of impoundments and generally inaccessible except by trail, with watersheds or shorelines essentially primitive and waters unpolluted.

Scenic Rivers - Those rivers or sections of rivers that are free of impoundments, with shorelines or watersheds still largely primitive and shorelines undeveloped, but accessible in places by roads.

Recreational River - Those rivers or sections of rivers that are readily accessible by road or railroad, that may have some development along their shorelines, and that may have undergone some impoundment or diversion in the past.

Thorne River and Hatchery Creek are eligible for inclusion in the Wild and Scenic River System because of the outstandingly remarkable fisheries, wildlife, recreation and scenic values they possess. Alternative P of the TLMP Draft Revision identifies 42 miles of the Thorne River–Hatchery Creek system as suitable for recommendation as a Scenic/Recreation River. The CPOW Project Area includes a large portion of the river within the recreational classification and a portion of the river meeting the scenic classification. Developed recreation facilities and timber management are acceptable within a river classified as recreational. Some developed recreation facilities and limited timber management could occur within a river classified as scenic, provided that the modifications are screened from view of the river and there are no adverse effects on the outstandingly remarakble values (FSH 1909.12, Chapter 8). Figure 3-30

shows the portions of the Thorne River–Hatchery Creek system within the Project Area being considered for recommendation in the Wild and Scenic River system.

Figure 3-30
Scenic/Recreation River Corridors in or Near CPOW

Wilderness

The National Wilderness Preservation Act of 1964 mandated that designated "wilderness areas...shall be administered for the use and enjoyment of the American people in such a manner as will leave them unimpaired for future use and enjoyment as wilderness, and so as to provide for the protection of these areas, the preservation of their wilderness character, and for the gathering and dissemination of information regarding their use and enjoyment as wilderness." In 1990, the Tongass Timber Reform Act (TTRA) amended ANILCA and designated five new wildernesses, including the Karta, and an addition to an existing wilderness.

The Karta Wilderness on Prince of Wales Island, established by TTRA, is the nearest wilderness area to the CPOW Project Area. This 39,984-acre area includes the drainage of the Karta River system at the head of Kasaan Bay, about five miles from the communities of Kasaan and Hollis. The Karta River area contains high value fish habitat for coho salmon. The two major lakes, Salmon Lake and Karta Lake, are important spawning sites for sockeye salmon. Recreation use of the Forest Service cabin is high, while the subsistence importance for sockeye salmon is documented in the Subsistence section of this chapter.

The Southeast boundary of the CPOW Project Area is adjacent to the sarta Wilderness. The nearest planned units are approximately 3,000 feet from the Wilderness area boundary (See Figure 1-1, Chapter 1.)

Roadless Areas

This section identifies the roadless areas in the Project Area which meet the minimum criteria for potential inclusion in the National Wilderness System. Roadless areas identified in the inventory as presented in the TLMP Draft Revision (1991a) may be considered for wilderness recommendation or may be managed for a wide range of other resource management activities. Once an area is roaded it is generally no longer available for wilderness consideration. Depending on when and how the activity was conducted, evidence of previous timber harvest, abandoned habitations, and historic mining may not necessarily result in an irreversible removal of land from future wilderness consideration.

To qualify as roadless, an area must contain at least 5,000 acres of undeveloped land which does not contain improved roads maintained for travel by passenger-type vehicles. However, areas less than 5,000 acres may qualify if they constitute a self-contained ecosystem such as an island, are contiguous to existing wilderness, or are ecologically isolated by topography and manageable in a natural condition.

Roadless areas may retain their roadless character by being managed for emphases which require relatively large, undeveloped or natural areas, such as are usually required for old-growth habitat, scenic backdrops, or primitive recreation.

Five inventoried roadless areas identified in the TLMP Draft Revision (1991a) are located within the CPOW Project Area, and are shown in Figure 3-1, in the Old Growth and Biodiversity section of this chapter. Table 3-63 shows the size of these roadless areas and the portion that lies within the CPOW Project Area.

Table 3-63
Inventoried Roadless Areas within the CPOW Project Area

Roadless Area	Total size (acres)	Portion within CPOW (acres)
Kogish	72,261	16,665
Karta	63,336	5,364
Thorne River	91,530	33,227
Ratz	6,586	6,586
Sarkar	65,075	33,508

Kogish (Roadless Area 509). Extensive timber harvest has occurred on the north and west sides of this roadless area, while Native lands to the east have been been extensively logged. The more scenic areas are concentrated around the relatively rugged and diverse terrain of Kogish Mountain and Staney Cone, and the intricate shorelines and island groups in Salt Lake Bay and Nossuk Bay. The only known use by local residents is for occasional hunting.

Though roading and logging is evident on the perimeter, the natural integrity of this area is very good. Because of its difficult access, there is excellent opportunity for solitude, except for logging sights and sounds near the boundaries. The fishing and solitude along the streams in the southwestern portion of the area are an attraction. Most recreation attractions are associated with the saltwater bays, anchorages, and

channels on the west side, where the experience level is primarily semi-primitive motorized.

The area contains 22,642 acres of tentatively suitable forest land. The 1989-94 Operating Period EIS for the KPC Long-term Contract (LTS EIS) approved the harvest of 2,026 acres near Kogish Mountain, Staney Cone, upper Staney Creek, and Shaheen Creek, affecting the character of about 10 percent of the roadless area. The geology of the area indicates some potential for discovery of valuable minerals. The rugged terrain and difficult access limit the area's recreation potential, although the western and southern boundaries have potential for shelter sites and boat anchorages for small boats and kayaks.

Karta (Roadless Area 510). Salmon Lake, Karta Lake, and the Karta River form the principle water systems within this roadless area. The area is accessible by water at Kasaan Bay and by road on the north, west and south sides. There are known prehistoric village sites, rock art and other evidence of cultural history. The area receives substantial recreation and subsistence use. There are five recreation use cabins and eight miles of trail within the roadless area.

The natural integrity of the area is very good. The Karta River drainage is so popular during the summer months that there is limited opportuntity for solitude. Heavy cabin use, floatplane traffic, and trail use contribute to high probabilty of encountering other parties during the summer. The alpine ridges that rim the Karta River Drainage provide more opportunity for solitude. Extensive timber harvest along the periphery of this roadless area cause the edges to fall within the roaded modified or semi-primitive motorized opportunity classes.

The 1990 Tongass Timber Reform Act designated 39,894 acres of the Karta River area as Wilderness. A portion of this roadless area is also within the Maybeso Experimental Forest.

Thorne River (Roadless Area 511). This roadless area includes a large part of the center of Prince of Wales Island and almost all of the Thorne River drainage. Access to the interior is by floatplane or canoe for skilled boaters only. Notable features include the area around Snakey Lakes, an intricate complex of narrow, winding freshwater bodies north of the main Thorne River drainage, and the many areas of grassy meadows and large stands of spruce in portions of the Thorne River. One recreation use cabin is located at Honker Lake. The trail/canoe system within the area is frequently used. The area receives significant local use for subsistence and recreation activities.

Very good opportunities for solitude exist within the area, excluding the fringe where the sights and sounds of logging and traffic may be evident. The interior offers outstanding opportunities for primitive recreation, particularly canoeing and fishing.

The area contains 40,183 acres of tentatively suitable forest land. The 1989-94 LTS EIS approved the harvest of 5,135 currently unroaded acres in the vicinity of the North Thorne River and Slide Creek. Under the TLMP Draft Revision, management for the Thorne River, Honker Divide, and Snakey Lakes area is for a combination of Scenic River, Scenic Viewshed, and Modified Landscape. This roadless area has outstanding fish habitat. Approximately 42 miles of the Thorne River and Hatchery Creek are eligible for inclusion in the Wild and Scenic River System and a suitability study is underway.

Ratz (Roadless Area 512). This area is characterized by very rugged terrain, including a well defined ridge and uplands west of Ratz Harbor, featuring flat wetlands and muskeg. The entire area is bounded by roads and timber harvest units, or by saltwater. The major scenic features are the diverse alpine terrain and small lakes near the summit of Baird Peak. The area receives light use by local residents for recreation and subsistence.

About half the area has been unaltered by human activity; the rest is moderately to heavily altered visually because of extensive timber harvest around the periphery. The area does have good natural integrity, and except during logging season, the opportunity for solitude is good. Potential for primitive recreation experiences is limited.

The area contains 2,884 acres of tentatively suitable forest land, and the area is within the primary sale area for the KPC Long-term Contract. The area is important as unaltered wildlife habitat adjacent to extensive timber harvest areas. There is relatively low potential for recreation development.

Sarkar (Roadless Area 514). This roadless area, located on the north end of Prince of Wales Island, is bounded on three sides by extensive roaded and logged areas. The area contains known prehistoric, historic and traditional use Native sites. There are three recreation use cabins and an associated trail. The Sarkar Lake chain has a long history of subsistence and recreation use and these uses continue today.

The natural integrity of the area is good and most of the area has remained unaltered by human activity. There is very good opportunity for solitude, except for the sights and sounds of logging along the fringes. The remoteness of the area, lack of human modifications and low probability of encountering others contribute in providing an excellent primitive recreation setting for activities such as canoeing, fishing and camping.

The area contains 26,943 acres of tentatively suitable forest land, though it would be difficult to manage for timber production because of the large number of lakes, streams and riparian areas and because the timber is located in small dispersed stands. This area was considered for wilderness designation in the 1990 Tongass Timber Reform Act but was not included. The TLMP Draft Revision designated this area to be managed for Primitive Recreation, Scenic River, Timber Production, and Modified Landscape. The area has high potential for developed and dispersed recreation, including trail construction, canoe portages in the Sarkar Lakes area, and additional recreation use cabins.

Outfitter and Guide Operations

Applications were received for outfitter/guide operations for freshwater fishing and big game hunting; permits were issued for some of these activities. Such requests are generally for the Thorne River, Staney Creek, the East Coastline of the Island, and areas easily accessible by road or boat. The Thorne Bay Ranger District is currently working on Environmental Assessments to determine the effects associated with outfitter and guide operations in relation to freshwater fishing and big game hunting.

Effects of the Alternatives

Under all alternatives, the CPOW Project Area will continue to provide a wide range of recreation opportunities, including a variety of recreation activities, settings, and experiences. Timber harvest and road construction will result in changes to some recreation settings. People seek to engage in recreation activities in specific areas for a variety of reasons and with a variety of expectations. Visitors seeking a primitive recreational experience will not be satisfied in an area with active timber management activities. On the other hand, visitors who seek recreation opportunities with easy access and enjoy being in the presence of others, may appreciate the ability to travel to areas on newly constructed roads. This characteristic of the recreation resource makes it necessary to focus attention on the mix of recreation settings, which varies by alternative.

The principal method used for analyzing the environmental consequences in the CPOW Project Area is based on this desire or expectation of forest visitors for specific types of experiences and settings. These settings and experience opportunities can be described using the Recreation Opportunity Spectrum (ROS). The effects on the recreational resource can be assessed by analyzing the change in the acres of each ROS class that would result under the alternatives. A change in ROS class resulting from the proposed actions in any alternative would reflect a change in the recreation opportunities available.

Direct and Indirect Effects

Recreation Opportunity Spectrum (ROS)

The distribution of Recreation Opportunities on POW is currently split between the motorized (51 percent) and nonmotorized (49 percent) categories, but Prince of Wales island is renowned in the region especially for the roaded recreation opportunities that are available. The CPOW Project Area, located in the heart of the island, has a high amount of motorized opportunities due to extensive roaded access from previous timber harvesting activities.

Each of the proposed action alternatives for the Project Area will further shift acres from primitive opportunity classes into the roaded modified class. Shifts from one opportunity class to another in small acre parcels will not individually have much of an effect on the recreation resources. However, large acreage shifts from the nonmotorized end of the spectrum to the motorized end of the spectrum will potentially limit opportunities for solitude and activities associated with unmodified settings.

Projected changes in the available opportunity classes as a result of harvesting activities are illustrated in Table 3-64 by alternative. A reduction of SPNM acres and an increase in RM recreation opportunities will occur in each action alternative. Users seeking experiences currently found in the SPNM will either tolerate the change in setting and the associated experience or they will be displaced to other parts of the Forest. Those seeking roaded access and a more modified environment will find more opportunities available to them as created by the harvest activities.

Table 3-64
Estimated Recreation Opportunity Spectrum (ROS), by Alternative, in Percent of Acres

ROS Class	Alt.1	Alt.1a	Alt.2	Alt.3	Alt.4	Alt.5
Semi-Prim Non-Mot	29	30	25	23	26	27
Semi-Prim Mot	6	6	6	6	6	6
Roaded Natural	2	2	2	2	2	2
Roaded Modified	62	61	65	68	65	64
Rural	1	1	1	1	1	1

Large blocks of SPNM acres occur in the following areas: 1) Trumpter Lake, 2) Baird Peak, 3) Manty Mountain–Slide Creek, 4) Paul Young Creek, 5) Kogish Mountain, and 6) Barnes Lake–Whale Pass–Mable Creek. These six areas represent the bulk of the acres remaining in the SPNM class. Comprised primarily of high alpine meadows or rugged backcountry, these areas are used for hunting, hiking, fishing, and other forms of undeveloped recreation. A closer look at how each alternative affects these six areas will indicate the broad changes in the ROS for the Project Area. Site-specific recreation place impacts will be discussed later in this section.

Alternative 1. Under the no-action alternative there will be no new timber harvest and no additional new road construction. The six SPNM areas will retain their attraction for those individuals seeking undeveloped recreation, but will provide no additional recreation opportunites for those seeking roaded access.

Alternative 1a. Under the no-action/no-harvest alternative, harvest operations will cease for uncompleted 1989-94 harvest units. This will increase the SPNM portions of Baird Peak and Kogish Mountain. Recreation opportunities will decrease for users seeking roaded access into these areas.

Alternative 2. Road construction or harvesting activities will occur in each of the SPNM areas. Four of the areas will receive very little impact, as cutting activities are located on the periphery with minor adjustments in acres anticipated.

The Manty Mountain–Slide Creek area will have helicopter harvest units. This will change the ROS in the immediate vicinity to RM, and a larger portion of the area will experience short-term noise impacts during the harvest activities. Two harvest units in the Baird Peak area will change the ROS setting in parts of the area from SPNM to RM.

The Barnes Lake–Whale Pass–Mable Creek area will be affected by 14 harvest units and associated new road construction. This area is currently a large contiguous block of unroaded acreage adjacent to the Sarkar Management Area. A large portion of this SPNM area will shift to RM which will in turn affect the Sarkar Lakes Area. Portions of the Sarkar Lakes Area will shift from primitive to SPNM. Four proposed cutting units (553-222, 571-213, 571-214, and 571-252) are adjacent to the Sarkar Management Area area and will need boundary establishment prior to layout.

Alternative 2 results in a shift of approximately 12,000 acres from SPNM to RM.

Alternative 3. Trumpter Lake Alpine, Paul Young Creek, and Kogish Mountain areas will not be affected by Alternative 3. The Manty Mountain–Slide Creek area and Baird Peak will experience similar impacts to those expressed in Alternative 2.

Alternative 3 proposes 55 cutting units throughout the Barnes Lake–Whale Pass–Mable Creek area. This area will change from a setting which is remote, and requires a high degree of self reliance, to one which will be easily accessible by vehicle. No acreage will remain in the SPNM class, since it will all shift to the RM class. There are eight units (553-213, 553-214, 553-215, 553-216, 553-222, 554.2-214, 571-213, and 571-252) located along the border of the Sarkar Management Area. These units will need a boundary establishment prior to layout. The noises associated with harvesting activities and roaded access from these units could potentially affect the solitude of the Sarkar Lakes area and shift the ROS from primitive to semi-primitive non-motorized. These units are not seen from the Sarkar Canoe Route, but the proposed road system could provide an additional access point into the area.

Alternative 3 results in a potential shift of approximately 19,000 acres from SPNM to RM.

Alternative 4. Trumpter Lake Alpine, Baird Peak, Paul Young Creek and Manty Mountain-Slide Creek areas will not be directly affected by proposed activities under this alternative. Kogish Mountain area will have a small shift in acres to the RM class in response to units along the eastern boundary.

The Barnes Lake-Whale Pass-Mable Creek area will be the one most affected by this alternative. Harvesting units and roads will be concentrated primarily in the northern half of the area between Rocky Bay and Barnes Lake. The 24 units and associated new road construction will cause this area to be reclassified as RM. There are three units (571-213, 571-214, and 571-252) located along the border of the Sarkar Management Area. These units will need a boundary establishment prior to layout.

Alternative 4 will result in approximately 8,300 acres shifting from SPNM to RM.

Alternative 5. Baird Peak is the only one of the six SPNM areas not affected by the proposed harvest activities of this alternative. Manty Mountain–Slide Creek will be affected in a similar way to that described for Alternative 2. Trumpter Alpine and Kogish Mountain will have small adjustments in acres to the RM class from harvest units along the fringe of the areas. The Barnes Lake–Whale Pass–Mable Creek area will also have an acreage adjustment from four proposed harvest units. These units, however, will not affect the majority of the area. There are five units (554.2-214, 571-209, 571-210, 571-214, and 571-252) located along the border of the Sarkar Management Area. These units will need a boundary establishment prior to layout.

The Paul Young Creek area has four proposed harvesting units which will change the ROS to RM. This area currently provides opportunities for solitude and self-reliance. Roaded access into this area has the potential to provide additional fishing opportunities and impacts to Paul Young Creek. It also has the potential to provide roaded access to the Karta Wilderness Area. The gentle terrain in this area would be conducive to easy linkage with the Karta River Trail. This improved access could result in increased use of the Wilderness Area.

The road providing access to harvest units in the Paul Young Creek area will be gated and closed to all motorized vehicles following completion of harvest activities. This

closure will remain in effect until the Karta Wilderness Implementation Schedule (WIS) determines the appropriate access for this area.

Alternative 5 has the least impact of the presented alternatives on acreage shifts from SPNM to RM, with approximately 5,300 acres.

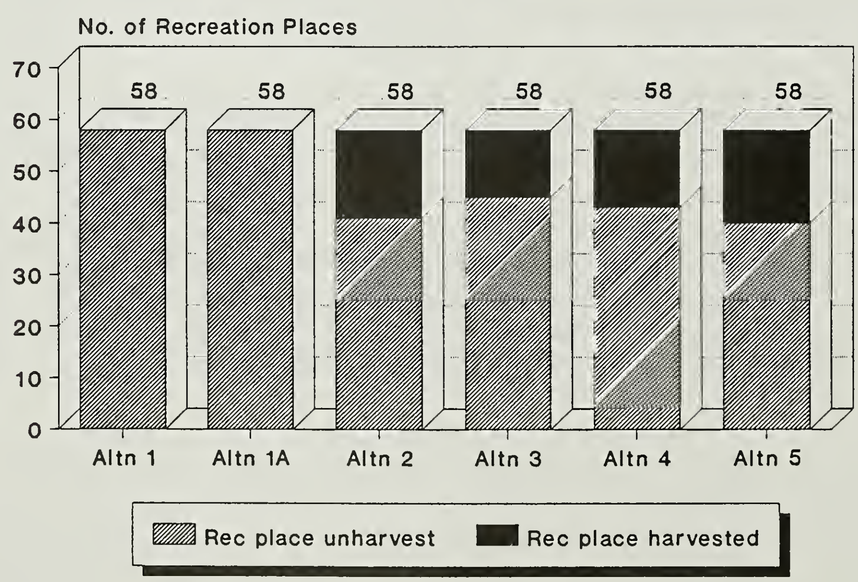
Recreation Places

People use specific Recreation Places for a variety of reasons with varying expectations. Changes in the setting due to timber harvest or road construction activities may alter the experience users are able to achieve from a specific site. Users will then be faced with the choice of continuing to use a site with an expected change in the recreational experience, or no longer using the site and possibly going elsewhere.

Harvest units or road construction within a Recreation Place which is currently in a primitive, semi-primitive non-motorized, or semi-primitive motorized class will generally cause it to be shifted to a Roaded Modified class. The roaded modified class involves a higher probability for interaction with other users, opportunities for more developed recreation facilities, and less opportunity for solitude. Harvesting units in places which are currently classified as roaded modified will result in further modifications to the existing setting and may or may not affect the public's desire to continue using it as a Recreation Place.

The current recreation inventory for the CPOW Project Area indicates 58 Recreation Places (see map, Figure 3-28). Thirty-four of these places will not be directly affected by proposed activities of the CPOW project, while 13–18 of them will be affected by at least one of the alternatives. Figure 3-31 shows the number of rec places affected by each alternative.

Figure 3-31
Timber Harvest within Recreation Places



Following is information for each of the affected Recreation Places. The numbers associated with the recreation place are for reference to Figure 3-28 and Table 3-62, earlier in this section.

1. **View Point #20 and Neck Lake**. Both of these sites have previous roaded access and have been affected by past activities. As proposed by Alternatives 4 and 5, noise may play a role in displacing users temporarily from View Point #20. All action alternatives propose harvesting in the Neck Lake recreation place. Users are expected to continue using this place throughout harvesting activities.

3. **Sarheen Cove**. Alternatives 3 and 5 propose harvest units toward the center of this Recreation Place, while historic and projected future recreational use has been concentrated away from this location. Consequently, these proposed harvest activities should have little effect upon recreation use.

5. **Whale Pass**. This undeveloped cove is a key anchorage and provides fishing access. Alternatives 3 and 4 will change the character of about 1/3 of the acreage to RM by providing roaded access. Proposed activities have the potential of increasing the size of this Recreation Place by providing roaded access for fishing and hunting. Solitude is expected to be more difficult to experience at this Recreation Place if constructed roads remain open after harvest. Access to this area will be determined through Road Management Objectives.

6/8. **Salt Water Lagoon/Sarkar Creek**. Alternative 2 proposes a harvest unit at the north end of the Salt Water Lagoon Recreation Place. This harvest unit is not expected to affect the recreation opportunities here. Alternatives 4 and 5 propose harvest unit 554-206 which is located in both the Salt Water Lagoon and Sarkar Creek places.

12. **Kasaan Island**. Alternatives 2, 4, and 5 will reclassify a portion of this Recreation Place to RM. The harvest access road could potentially be used to provide access to saltwater and ultimately change the focus of recreation opportunities provided by this Recreation Place.

14/15. **Naukati Lake and Naukati Lake Access**. Naukati Lake is an alpine area used for hiking, hunting, and for its scenic qualities. Alternatives 4 and 5 include harvest units on the edge of this Recreation Place. Users will most likely be displaced until after harvesting activities, and a portion of the place will be shifted to Roaded Modified.

16. **Logjam Creek**. Fishing is the primary use of this Recreation Place. Recreational activities are currently located near a primary travel corridor. Solitude is not a critical component of this place, so harvesting activities are not expected to displace users or have a negative impact on the site.

18. **Staney Creek**. This Recreation Place receives concentrated use in the vicinity of the cabin, the campgrounds, and along the creek. Cutting units as proposed by Alternatives 2, 4, and 5 (located upstream from the recreation sites) may temporarily displace users during operations, but should not affect the visuals or long-term use of the area.

22. **Kogish Mountain**. This alpine area is used primarily for hunting and hiking. Alternatives 2 and 5 propose harvest units at the northern end of this Recreation Place, which would allow the remainder of the place to maintain a SPNM character. Alternative 3 would include a unit at the center of this Recreation Place. The associated roads will contribute to changing this portion of the Recreation Place to RM. Use may increase with the additional access.

23. **Upper Staney Creek**. One half of this Recreation Place will change from SPNM to RM. Use in the form of hunting will continue during and after harvesting operations.

25. **Staney Meadows**. Alternatives 2, 4, and 5 will have harvest units with this Recreation Place. It is anticipated that people will continue to use the site for viewing with very little impact.

26. **Mable Creek**. Mable Creek is actually a portion of the Sarkar Lakes primitive Recreation Place. Alternatives 2 and 3 propose cutting unit 553-222 which is adjacent to the primitive recreation area. The cutting unit will not be visible from the Sarkar Canoe Route, but the proximity will change the ROS class from Primitive to SPNM. Part of Mable Creek will shift from primitive to roaded modified. Access to this area will be determined through Road Management Objectives.

28. **Barnes Lake**. Alternatives 3 and 4 will cause a small acreage change in the ROS class from SPM to RM. Short-term impacts will be realized from road construction and harvesting noise. These alternatives will not affect the Recreation River eligibility as proposed by TLMP Draft Revision (1991a).

29. **Gold and Galligan**. Alternative 4 provides additional roaded access to this area. The SPM character of this recreation place will be altered very minimally to RM. The Scenic and Recreational River eligibility will not be changed.

34. **Trumpter Alpine**. Harvest units will change the fringe of this SPNM area to RM as proposed by Alternatives 2 and 5. Use of this Recreation Place is expected to continue.

35. **Manty Mountain**. This SPNM area will experience approximately a 700-acre shift into the RM class as proposed by Alternatives 2, 3, and 5. Hunting activities are expected to continue, but may be affected if timber harvest occurs during the primary hunting seasons. There is the potential for short-term displacement of users.

36. **Luck Lake**. This Roaded Modified Recreation Place has visible evidence of previous cutting activities. Alternatives 2, 4, and 5 propose harvesting units on or adjacent to a trail location. This trail is used for fishing and access to saltwater. Unit 581-200 will be visible from the Eagle Creek Bridge.

38. **North Baird**. Harvest unit 581-218 as proposed by Alternatives 2, 4, and 5 is located at a proposed trailhead facility. The unit design could complement the development of this recreation facility.

39. **Baird Peak**. Alternatives 2 and 3 propose harvest units which will change portions of this SPNM area to RM. These changes in settings are not expected to change the overall use of the area.

40. **Ratz Harbor**. All action alternatives propose harvest units in this RM Recreation Place. The proximity between harvest units and new recreation facilities (constructed in 1992) may result in the short-term displacement of users during harvesting activities.

45. **Slide Creek**. This is a heavily modified recreation place used for hunting and other dispersed activities. Harvest units as proposed by all alternatives will create short-term impacts in the forms of noise and traffic. The overall impact will be minimal.

50. **Thorne Bay**. Although Alternatives 2, 3, and 5 propose harvest units within this recreation place, there will be no adverse effect.

56. **Salt Chuck**. This Recreation Place provides the closest opportunity from Thorne Bay for hiking to saltwater. Each of the action alternatives proposes harvesting in this Recreation Place. This activity is expected to have very little impact on use of the area other than short-term noise.

58. **Lake Ellen**. Part of this Recreation Place will be shifted to RM as proposed by Alternative 5. The terrain is gentle and the visual impacts of harvest unit 598-203 are expected to be minimal.

Wild and Scenic Rivers

No harvest units proposed by any of the alternatives lie within the 1/4 mile corridor adjacent to the Thorne River–Hatchery Creek waterway being considered for Recreation/Scenic River designation (TLMP Draft Revision 1991a). The outstanding characteristics of this river are scenery, wildlife, fisheries and recreation.

Units proposed in the Barnes Lake, and Gold and Galligan areas are located so that they will not be seen from the water. The only anticipated impact will be temporary noise feedback from active logging operations. This portion of the river is recommended for Recreation River designation, which does not preclude harvesting units.

Wilderness

The southeast boundary of the CPOW Project Area is adjacent to the Karta Wilderness. The nearest planned units are approximately 3,000 feet from the nearest Wilderness boundary. An existing trail follows the Karta River drainage. New roads to proposed harvest units in the Paul Young Creek area could provide improved roaded access for people to park and hike into the Karta River drainage. The road providing access to the Paul Young Creek area will be gated and closed to all motorized vehicles following completion of harvest activities. This closure will remain in effect until the Karta Wilderness Implementation Schedule (WIS) determines the appropriate access for this area.

Wilderness areas are usually designed to contain their own buffers or "transition zones" from the edges to the core of the Wilderness area, but proposed adjacent activities will have impacts on wilderness values. The indirect effects of nearby harvests include a change in adjacent ROS classes and a resulting increase in demand on remaining primitive and semi-primitive recreation settings.

Roadless Areas

Table 3-65 shows the harvest acres proposed by the various alternatives within the inventoried roadless areas. It also shows the overall size of the roadless area, as well as the area within the CPOW Project Area.

Table 3-65
Harvest Acres within Inventoried Roadless Acres, by Alternative, in Acres

Roadless Area	Total	CPOW	Alt.1	Alt.1a	Alt.2	Alt.3	Alt.4	Alt.5
Kogish	72,261	16,665	0	0	815	923	431	919
Ratz	6,586	6,586	0	0	296	269	220	73
Sarkar	65,076	33,508	0	0	831	2,645	1,747	560
Karta	63,336	5,364	0	0	0	0	0	334
Thorne	91,530	33,227	0	0	1,515	1,518	580	1,274
Total	298,789	95,350	0	0	3,457	5,355	2,978	3,160

Outfitter and Guide Operations

Outfitter and guide operation success is very dependent on the experience that can be provided for each client. Road construction and timber harvesting activities which alter the natural setting and affect wildlife use patterns may have a negative impact on some of these operations. However, these roads will provide additional access into wildlife use areas, thereby increasing the opportunties for taking of fish and game.

Cumulative Effects

Cumulative effects consider those events which are scheduled to occur in the reasonably foreseeable future. For this Draft EIS, the reasonably foreseeable future is held to be the termination of the Long-Term Contract in 2004. Appendix A has scheduled subsequent timber entries of approximately 270 MMBF (10,000 acres) into the CPOW Project Area to occur by the termination date of the contract. Actual unit locations will be determined based upon future environmental analyses, so site-specific effects cannot be predicted at this time.

Recreation Opportunity Spectrum

Prior to the Long-Term Contract, Prince of Wales Island was almost exclusively classified as semi-primitive non-motorized (SPNM). Prince of Wales Island currently provides both roaded and unroaded recreation opportunities. Harvesting and road building will continue as necessary to support the KPC Long-Term Contract, and as a result more roaded modified opportunities and fewer semi-primitive non-motorized opportunities will become available. This trend is consistent in Southeast Alaska as confirmed by analysis conducted in the TLMP Supplement to the Draft EIS. The CPOW Project Area provides ample opportunities for roaded modified recreation settings. Subsequent timber entries will result in an increase in roaded recreation.

Recreation Places

Prior to the Long-Term Contract and subsequent development of the ferry terminal at Hollis, access to recreation places on Prince of Wales Island was almost strictly limited to saltwater. The Alaska Marine Ferry System now provides access to the island for residents and recreationists alike. The improved and expanded ferry schedule will facilitate increased demand for recreation opportunities. As more people visit some areas, there will be fewer chances of finding solitude. Some users seeking fewer contacts with others, fewer conveniences, and more natural-appearing settings will be displaced or dissatisfied. Other recreationists seeking easy access, developed facilities,

and a higher probability of encountering others, will have more settings to choose from.

Some recreation places will change from natural to more developed over time. There will be an overall shift in opportunities with more settings and activities available in the roaded modified part of the Recreation Opportunity Spectrum.

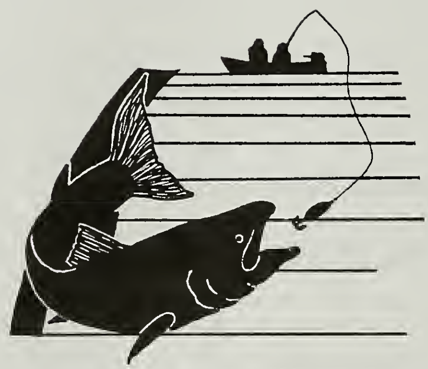
Roadless Areas

Prior to the Long-Term Contract, all of Prince of Wales Island was roadless. The TLMP Draft Revision has scheduled harvest of all suitable timber land within the inventoried roadless areas, with the exception of the Sarkar Management Area and the Karta Wilderness. As timber harvest proceeds through the end of the termination of the Long-Term Contract, increasing harvest will occur within roadless areas, as they contain significant quantities of harvestable timber. This timber may become of increasing importance as timber harvest opportunities within previously harvested areas become limited by NFMA dispersion requirements. The currently inventoried roadless areas will gradually shrink, so that their largest components will include only those areas that the TLMP Draft Revision has reserved from cutting, as well as any adjacent inoperable lands.

Wild and Scenic Rivers

The TLMP Revision has scheduled future harvest within the Thorne River corridor—including both the portion within the CPOW Project Area and that portion which lies south of this area. The southern portion of the Thorne River will be included within the Project Area of the Control Lake EIS (187 MMBF), scheduled for 1994 (see Appendix A).

Gold and Galligan backwaters provide opportunities for semi-primitive canoeing, kayaking, and boating.



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CULTURAL RESOURCES

Key Terms

Cultural Resources - all evidence of past human-related activity, dating from the earliest beginnings to the fairly recent past
Sensitivity Zone - Defined as "high," "medium," or "low," based on the probability that they might contain cultural resources.
SHPO - State Historic Preservation Officer

Affected Environment

Introduction

The CPOW Project Area has a diverse cultural history, which includes an occupation dating from the Paleomarine-Early Prehistoric Maritime period (10,000 B.C.–4500 B.C.) through the Northwest Coast Developmental Phase-Late Prehistoric Maritime period (4500 B.C.–A.D. 1700) to the protohistoric-historic Haida and Tlingit. It also considers the effect that various traders, miners, fishermen, loggers, subsistence users, and the USDA Forest Service (from 1907 to the present) have had on the area. Systematic archeological survey and excavation conducted within the boundaries of the Project Area indicate that it is likely Prince of Wales Island has been used continuously for at least the past 7,000 years.

Cultural resources include all evidence of past human-related activity, dating from the earliest beginnings to the fairly recent past. Cultural resources on the Tongass National Forest are varied and numerous, with sites ranging from prehistoric times through historic periods. Prehistoric remains include: campsites, village sites, graves, resource areas, rock art, portages, and rock shelters. Historic sites include: culturally modified trees, houses, cabins, mines, quarries, trails, portages, tramways, salteries, canneries, boatworks, boats, and shipwrecks.

The oldest sites located in Southeast Alaska to date are approximately 10,000 years old and are characterized by microblades (small stone blades with sharp cutting edges) and microblade cores (the prepared stone from which blades are removed) (Ackerman 1972; Davis 1979, 1990; Davis et al. 1989). These types of tools are thought to be associated with cultures which adapted to a marine resource economy, and which were present approximately 10,000 to 5,000 years ago. This technology seems to have been replaced by a ground and polished slate tool industry (Davis et al. 1989, Davis 1990).

Many of these cultural remains provide the only record of former human occupation, work areas, and lifestyles. Some of these sites may represent cultural traditions associated with early human migration into Alaska, and others may be significant for European exploration and historic economic development. Additionally, some areas may have traditional or spiritual significance for contemporary Native Alaskans. The

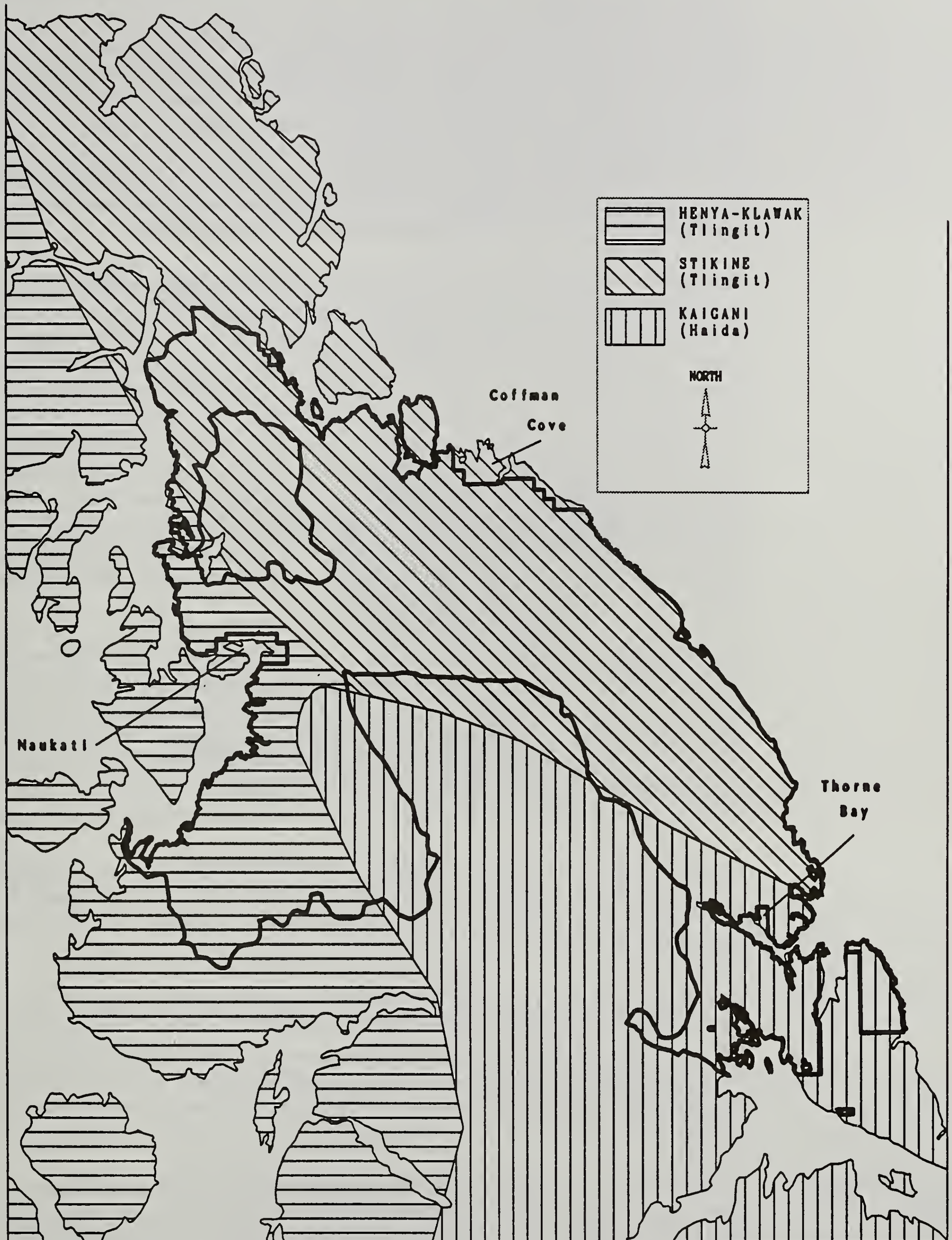
recovery of information from these sites and objects is important in reconstructing previous human behavior and adaptation in response to environmental or social change and, represent an important part of our local, regional, and national cultural heritage.

Ethnohistory

Prince of Wales Island is included in the traditional homeland of the Tlingit. Prior to and during European contact, the Project Area was occupied by three Tlingit groups: the Stikine (Shtax'heen Kwaan), whose territory included northeastern Prince of Wales from Tolstoi Bay to Red Bay, and the Henya (Heinyaa Kwaan) and Klawock (Lawaak Kwaan), whose territories were located on the western portions of Prince of Wales. Formerly the entire Island had been occupied by Tlingit groups, with the Tongass Tribe (Tantakwaan) on the southern portions of the island. However, by the early 1700's the Kaigani Haidas migrated into the southern portions of Prince of Wales island and displaced the Tlingit. The territorial boundary of the Kaigani stretched from about Tolstoi Bay on the east to the vicinity of Craig on the western portion of Prince of Wales Island. See Figure 3-32.

The historic period in Alaska began with the second Kamchatka Expedition of Vitus Bering in 1741 and developed through various stages of contact with European people and goods. By the end of the nineteenth century, separate settlements at Klawock and Hydaburg were established by white settlers and Natives, respectively. Historic explorations in the Project Area occurred in 1792 with Jacinto Caamano; 1794-1779 with Maurella, Perez and Bodega's expeditions; and in 1793 when George Vancouver's long boats explored Behm Canal and Clarence Strait with the British ships Discovery and Chatham (Mobley 1984, p.11; 1989, p.9).

Figure 3-32
CPOW Primary Native Cultures



As depicted by G.T. Emmons, 1888.

Cultural Resource Sites

In accordance with the National Historic Preservation Act of 1966, as amended, the National Environmental Policy Act of 1969, and a series of implementing regulations and policy direction, the Ketchikan Area of the Tongass National Forest is undertaking a program to identify, evaluate, preserve, and protect cultural resources as a nonrenewable national heritage. A Survey Design prepared by the Ketchikan Area archeologists for the CPOW project, will provide a planned outline for conducting complete archaeological surveys in certain prescribed areas of the Project Area. The purpose of the cultural resource investigations is to identify any possible impacts that the proposed activities would have on cultural resources in the area that may be eligible for inclusion in the National Register of Historic Places.

USDA Forest Service, Region 10 Cultural Resource Guidelines define high and low sensitivity zones, which are based on the probability that they might contain cultural resources. Refinement of this concept is detailed within the Survey Design. Through a review of existing data and analyses, areas of higher probability for locating various historic or prehistoric site types are determined. All areas between zero and 100 feet above sea level, proximity to known site locations at any elevation, lakes and streams containing salmon species within 100 feet above sea level, passes and portages, known previous land use patterns, fossil beaches, and myth or legend sites are designated high sensitivity zones and require a search of existing data and field investigation. Low sensitivity zones include all other areas with slope angles greater than 30 percent, muskegs, and areas where, because of specific environmental conditions, the probability of the occurrence of cultural resources is so low it is essentially zero, as determined by review of existing data.

An existing data search has been conducted to identify any previously recorded sites located within the Project Area and/or near the proposed harvest units. A number of sources are being consulted, including the Alaska Heritage Resources Survey (AHRS), the National Register of Historic Places (NRHP), the Forest Service site and survey files, and the Tongass National Forest Cultural Resources Overview (Arndt, Sackett and Ketz 1987). Reports submitted to the Forest Service in the past were also searched for information that might pertain to the area presently under consideration.

To date, all previous surface inspections account for approximately 10,656 acres within the Project Area. Information gathered from additional inventory efforts will provide information about resource distribution, sensitivity to damage, and management of the resource.

Based on previous inventory results, the average site density for the Project Area is approximately: one site per 133 acres in the High Probability category, one site per 8,184 acres in the Medium Probability category, and zero sites per acre in the Low Probability areas. Modifications to the current strategy as proposed in the research design should increase the likelihood of locating significant sites in a more cost-efficient manner.

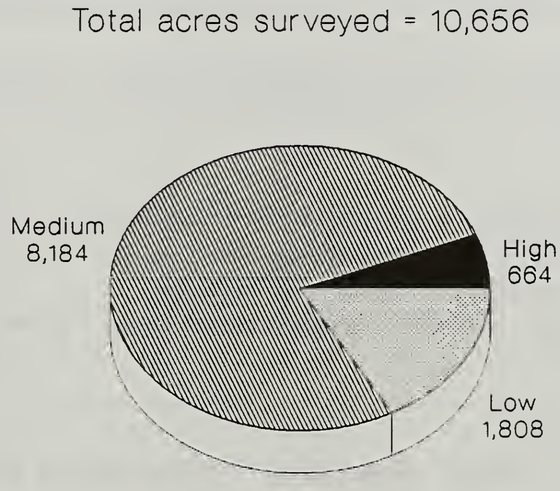
Known Cultural Resources

Cultural resources located within the Project Area represent an important part of our local, regional, and national cultural heritage. Cultural resources that remain on the Project Area are a nonrenewable resource and may not be duplicated elsewhere. As archaeological surveys are conducted, cultural resources will continue to be identified. Information gathered from these surveys will provide opportunities to learn more about resource distribution, improved methods of site discovery, sensitivity to damage,

and data collection. Such an approach will provide continued and improved flexibility as methods, technology, and management priorities evolve with time.

Numerous surveys have been conducted in the Project Area at various levels of intensity, ranging from test excavations of identified cultural sites to cursory surveys (simply walking through areas that may contain archeological sites). Most of these surveys were conducted by Forest Service personnel in support of the timber sale program. Some 33 historic or prehistoric sites, and 15 mine sites have been identified in the CPOW Project Area. Specific locational information is protected, to prevent vandalism or unauthorized use of a site. Figure 3-33 shows the total number of acres in the Project Area where previous cultural surveys have been conducted. A complete list of reports can be found in the Planning Record.

Figure 3-33
Previous Cultural Surveys in the CPOW Project Area



Effects of the Alternatives

Direct and Indirect Effects

Types of Potential Impacts

The preservation and protection of cultural resources are closely associated with the location of the resource, the nature of the management activity, and the environmental characteristics where management activities occur. Impacts to the resource may occur from natural forces, from public access, or from project-related activities. Erosion and other environmental effects may also lead to deterioration of cultural resource sites.

Timber harvest activities include the construction and reconstruction of roads, which may lead to an increase in opportunities for public use of cultural resources in the Project Area. Such increased use may enhance understanding of the past—capturing knowledge and information that may disappear over time due to natural decay—and may provide opportunities for interpretation and education. However, public use may destroy cultural resource sites through inadvertent damage caused by compaction, or other ground disturbing activities. Vandalism—including relic collecting, defacement, and theft—results in the loss of information and destruction of the resource. Protection of significant cultural resource sites from inappropriate public use includes the establishment of public education programs, maintaining confidentiality about

specific site locations, monitoring, and directing public use away from the most vulnerable sites.

Specific CPOW Potential Impacts

Alternatives 1 and 1a would result in no further effects on cultural resources from the KPC Long-Term Contract activities. The remaining action alternatives (2–5) under consideration for the CPOW Project Area are not expected to differ in their impacts on cultural resources.

Analysis of the alternatives indicates that approximately 5,000 acres of units and associated roads are in areas of high probability and are designated for intensive survey. It is anticipated that an additional 1,000 acres of higher probability area not affected by project activities will also be surveyed within the Project Area. Of the units proposed for harvest by any of the alternatives, approximately 18 are close to known cultural sites or areas of historic mining activity.

Units selected for survey are listed in Table 3-66. Results of the survey will be presented in the Final EIS. These units were high-probability based on the following criteria:

1. Units with 2 or more acres < 100' elevation
2. Units in karst topography areas
3. Units bordered by Class I streams
4. Units adjacent to archaeological sites or mines

Table 3-66
CPOW Units in Alternatives 2-5 Designated for Complete Cultural Survey

Unit #	# Acres	Alternatives	Criteria
549.2-201	31	5	3
-205	29	3	2
-206	37	3	2
-207	20	5	2
-230	31	4	2
550-206	16	4,5	2
-208	20	5	2
-209	34	4	2
-211	44	3,4,5	2
-213	39	2,3,4,5	2
-214	20	2,3,4,5	2
-215	37	2,4,5	2
-218	57	2,3,5	4 (site)
-222	24	2	4 (site)
-227	71	3,4	2
-228	50	3,4,5	2
-230	105	3,4,5	2
-237	36	2,3,4	2
-238	22	2,3,4	2
-239	95	2,3,4	2

Table 3-66 Continued

Unit #	# Acres	Alternatives	Criteria
552-201	60	3,4	1
-216	36	3,4	3
-221	56	3,4	1
-223	28	3	1
-226	16	3	1
-258	19	3	1,4 (site)
-262	28	3,4	1
-269	43	3	1
-270	20	3	1
-271	30	3	1
553-209	19	3	3
-211	50	3	3
-245	39		3
554.2-200	54	2,5	2
554.2-201	18	2,5	1
-206	46	4,5	1,4 (site)
-213	26	2,4	1,4 (mine)
-214	46	3,5	1
-215	27	3,4,5	2
-220	62	2,4,5	1,2,4 (site)
-225	25	2,4	1,4 (site)
557-200B	77	2,4,5	2
-202	42	2,3,4,5	2
571-214	34	2,4,5	2
-225	11	2,4,5	2
-227	122	2,4	2
-252	51	2,3,4,5	2
-253	91	2,3,4,5	2
-256	43	2,3,4,5	2
-257	66	2,4,5	2
-258	48	2,5	2
-260	61	2	2
-265	32	2,4,5	2
-266	73	3,4,5	2
-267	48	2,4,5	1,2
-268	64	2,4,5	2
-274	28	2,4,5	1,4 (site)
572-222	40	2	3
-226	30	2	3

Table 3-66 Continued

Unit #	# Acres	Alternatives	Criteria
573-210	21	4	1
-228	29	4	1,4 (site)
-264	67	4	3
-268	66	4	3
-274	63	2,4	1
-289	69	4	3
-296	73	3,4	1
-297	61	3,4	1,4 (site, mine)
-308	57	3	4 (site, mine)
-314	110	4	4 (site, mine)
577-202	21	4,5	2
-214	46	2,3,5	2
-280	18	2,3,4,5	2
-281	27	2,3,4,5	2
-284	48	2,3,4,5	2
-286	52	2,3,4,5	2
579-223	41	4,5	3
580-227B	42	2,3,4,5	2
581-204B	47	2,4,5	1
583-216	83	2,3,5	3
-229	53	2,3,4,5	1
-256	38	2,3,4,5	1
-258	81	3,4,5	1
584-250	52	2,3,4,5	1,4 (site)
-251	67	2,3,4,5	3
-252	27	2,4,5	1,4 (site)
-267	29	2,3	4 (site)
587.1-212	42	3,5	1
-212B	19	5	1
-214	35	2,4,5	1
-220	42	2,4,5	1
-221	38	2,4,5	4 (site)
588-215B	32	4	1
-237	41	4	3
598-203	44	5	4 (site, mine)
-206	26	5	4 (mine)
-218	58	2,4,5	3
-235	26	2,3	4 (mine)
-245	38	2	4 (site)
-249	73	5	1

There are no known myth legend sites associated with these proposed activities.

Before ground-disturbing activities take place, Forest Service cultural resource specialists will have field investigated these high probability units and other survey locales, and identified and evaluated cultural resource sites that may be affected by the proposed activities.

Cumulative Effects

Impacts from natural decay, landscape changes, private developments, and timber management activities collectively result in the loss of the cultural resources in Southeast Alaska. Development activities of all kinds pose particular threats to cultural resources because such activities tend to be located in the same places that cultural resources are found, such as sheltered coastal settings.

It is impossible to determine the exact nature of resources that may have been previously disturbed in the Project Area. Intensive cultural resource investigations and mitigation measures have been implemented only since the 1980's. The implementation of updated research and survey designs based upon the results of previous work and current methodology and technology, combined with various mitigation measures will preserve significant sites and provide data that will guide future research and management activities.

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SUBSISTENCE

Key Terms

Alaska National Interest Lands Conservation Act (ANILCA) - requires evaluations of subsistence impacts before changing the use of certain Federal lands
Non-rural - a community with more than 7,000 people; doesn't qualify for priority use of subsistence resources
Rural - a community of fewer than 2,500 people; presumed rural, and residents quality for priority use of subsistence resources
Subsistence - customary and traditional uses by rural Alaskans of wild renewable resources
Wildlife Analysis Area (WAA) - a division of land designated by Alaska Department of Fish and Game and used by the USDA Forest Service for wildlife analysis

Affected Environment

With the passage of the Alaska National Interest Lands Conservation Act (ANILCA), Congress recognized the importance of subsistence resource gathering to the rural communities of Alaska. ANILCA defines subsistence as:

> "The customary and traditional uses by rural Alaska residents of wild, renewable resources for direct personal or family consumption as food, shelter, fuel, clothing, tools, or transportation; for the making and selling of handicraft articles out of nonedible byproducts of fish and wildlife resources taken for personal or family consumption; for barter, or sharing for personal or family consumption; and for customary trade."

ANILCA provides for "the continuation of the opportunity for subsistence uses by rural residents of Alaska, including both Natives and non-Natives, on public lands." It also legislates that "customary and traditional" subsistence uses of the renewable resources "shall be the priority consumptive uses of all such resources on the public lands of Alaska."

Effective July 1, 1990, the Federal government took over the management of subsistence use of fish and wildlife resources on Federal public lands. This management is regulated by the Federal Subsistence Board. The taking of fish and wildlife on public lands for subsistence uses is restricted to Alaska residents of rural areas or rural communities. Nonrural residents are not provided a preference for the taking of fish and wildlife on public lands. Juneau and Ketchikan have been determined to be nonrural by the Federal Subsistence Board.

Many Southeast residents use natural resources as a base or supplement to their livelihoods. Nearly a third of rural households in Southeast Alaska get at least half their meat and fish by hunting and fishing (Holleman and Kruse 1991). Fish and game are widely preferred sources of food among Southeast households, regardless of their incomes. Examples of major subsistence resources include: deer, salmon, halibut, trout, harbor seals, crabs, clams, waterfowl, and berries (Kruse and Muth 1990).

Subsistence activities represent a major focus of life for rural residents. These resource or subsistence gathering activities include: hunting for deer, bear, marine mammals, and birds; digging clams; catching fish and shellfish (crabs, shrimp); harvesting marine invertebrates; trapping furbearers; collecting firewood; collecting herring and sea bird eggs; and collecting edible berries, plants and roots. Subsistence goods may be eaten, traded, given away, or made into an item of use or decoration. For example, the fur from the marten or sea otter may be used for regalia costumes which are used in ceremony and dance.

Even for households that can afford to purchase all their their own food, the act of gathering subsistence resources is an important cultural aspect reflecting deeply held attitudes, values, and beliefs. Some traditional foods are not available through any other means than subsistence, and the occasions for gathering wild foods and edible plants often are social events. Historical patterns of movement such as the annual cycle of dispersal into small family groups at summer fishing camps and then to larger gatherings at protected winter villages are also linked to the tradition of subsistence gathering. See the Cultural section of this chapter for a map of traditional Native lands in the CPOW Project Area.

Average per capita income may or may not indicate the importance of subsistence to a community. While individuals of low income may have a greater dependence on subsistence gathering, individuals with a higher income may simply be in a position to have a more comfortable lifestyle because they combine their subsistence activities with their ability to purchase goods. Higher income does not deter an individual from gathering resources and sharing those with friends and family (Kruse and Muth 1990). Findings from the Tongass Resource Use Cooperative Survey (TRUCS) (see below) indicate that "members of the highest income group have the highest mean harvest and the lowest mean percent of meat derived from subsistence activities" (Kruse and Muth 1990).

Sharing of subsistence resources is important not only among households within communities, but also with extended families and friends in other areas. This includes sharing with those households that are unable to participate in the harvest of resources. And because some communities have access to resources not found in other communities, sharing of subsistence resources occurs between as well as within communities.

Tongass Resource Use Cooperative Survey (TRUCS)

In 1988, a detailed subsistence resource and use inventory of the Tongass National Forest was started as part of the Tongass Land Management Plan (TLMP) Revision. The Tongass Resource Use Cooperative Study (TRUCS) of 1988 was directed by the University of Alaska's Institute of Social and Economic Research in conjunction with the U.S. Forest Service, and the Division of Subsistence of the Alaska Department of Fish and Game (Kruse and Frazier 1988).

In the TRUCS, reseachers went to over 30 communities in Southeast Alaska and conducted interviews with randomly selected households about their 1987 subsistence

uses. As part of the interview, household residents were also asked to draw special maps of the areas used for hunting and fishing. As stated by Kruse and Frazier in the TRUCS (1988), all figures used in reporting subsistence are based on a sample of households. Therefore, it is entirely possible that actual amounts harvested were either higher or lower than reported by sample households. A detailed description of the survey is found in the TRUCS Technical Report Number One from the Institute of Social and Economic Research, University of Alaska.

Goldschmidt and Haas (1946) identified the land-use patterns associated with Native communities that existed in the mid-twentieth century in Southeast Alaska. Comparing these maps with information from the 1988 TRUCS maps and ADF&G Subsistence Division maps, it appears that hunting and fishing use by Natives in Southeast Alaska is still tied to some extent to historical traditions determining who may hunt and fish on which lands. Despite the introduction of technological innovations (such as large, modern boats) that would allow residents of Native communities to range much greater distances than in earlier periods, their use appears to be concentrated in locations generally conforming to traditional clan land ownership boundaries. The distribution of harvest locations for non-Native communities, on the other hand, is often apt to range over greater areas.

Subsistence is a complex issue covering many aspects of lifestyles which are embodied in the people who reside in Alaska. In striving to be sensitive to the subsistence needs of the users of the CPOW Project Area, the Forest Service, with the help of the Alaska Department of Fish and Game (ADF&G) Subsistence Division, and the Institute of Social and Economic Research (ISER), determined which communities should be included in the subsistence analysis for the CPOW project. To make this determination, data collected in the TRUCS (Holleman and Kruse 1991) and ADF&G deer harvest survey statistics were used to identify communities which use the Project Area for subsistence.

The following communities were selected to be analyzed in this document: Coffman Cove, Craig, Hollis, Hydaburg, Kasaan, Ketchikan, Klawock, Petersburg, Point Baker, Port Protection, Thorne Bay, Whale Pass, and Wrangell. Of these communities, all are designated rural except Ketchikan.

Affected Areas

Prince of Wales Island (POW) is located 28 air miles from Petersburg, 30 miles from Wrangell, and 20 miles from Ketchikan. The rural communities of Coffman Cove, Craig, Hollis, Hydaburg, Klawock, Point Baker, Port Protection, Thorne Bay, and Whale Pass are all located on POW and can access the Project Area via the existing road system. Prince of Wales Island is fairly accessible by boat from Wrangell and Petersburg. The Alaska Marine Highway provides service to Prince of Wales Island via the ferry terminal located at Hollis, thus making the CPOW Project Area accessible to other Southeast Alaska communities. The following discussion focuses on the areas used by each community for subsistence. For other social and economic features of each community, see the Socio-Economic section of this chapter.

Coffman Cove

The alpine areas to the south are used for early season deer hunting. Fishing occurs in Eagle Creek and Hatchery Creek. The tidal flats extending east from Coffman Cove to Lake Bay and Barnes Lake are popular areas for waterfowl and bear hunting. Some trapping occurs along the shoreline of Sweetwater Lake, while the lower reaches of Logjam Creek and Sweetwater Lake are used for fishing.

Craig

Areas adjacent to the road system—Thorne River, Hatchery Creek, Logjam creek, Staney Creek and Sarkar Lake—are some of the major subsistence use areas within the CPOW project area.

Hollis

Areas within the pPoject Area used by Hollis residents include areas adjacent to the road system for deer hunting, and Staney Creek, Hatchery Creek, Logjam Creek, and Thorne River for fishing.

Hydaburg

Hydaburg subsistence use within the Project Area is dispersed throughout the area, according to TRUCS maps.

Kasaan

Areas used for subsistence purposes include Karta River for harvest of fish, particularly sockeye salmon; Salt Chuck for waterfowl and bear; and parts of Kasaan Peninsula for deer hunting.

Ketchikan

Ketchikan was not included in the TRUCS study, since it is defined as nonrural. Hence according to federal law, Ketchikan does not quality for priority use of subsistence resources.

Klawock

Subsistence harvest methods within the community of Klawock have been changing since the road tie with Hollis was made in 1984. Prior to that time subsistence harvest was mostly tied to boating activities. Since road access to the rest of the island has been available to the residents of Klawock, there has been a shift from using boats to harvest subsistence materials, to using trucks and cars (Ellanna and Sherrod 1986).

Deer harvest takes places on the islands of Noyes, Lulu, San Fernando, San Juan Bautista, Suemez, Heceta, and St. Phillips. In the Project Area, deer harvest occurs along the entire road system (but primarily in the Staney Creek, Logjam Creek and Thorne River areas), and beach fringe areas. Duck and goose harvest occurs in Big Salt Lake.

Petersburg

Residents of Petersburg reported in the TRUCS survey and in a Survey of Harvest and Use of Fish and Wildlife Resources by Residents of Petersburg (Smythe 1988) that they used the entire area from Big Salt Lake east to Thorne Bay, north to the Sarkar Lake/Coffman Cove area for deer hunting.

Port Protection/Point Baker

While the most important subsistence use areas for Port Protection and Point Baker (North end of Kosciuski and Prince of Wales islands) are outside of the Project Area,

several areas within the Project Area are also important hunting and fishing locations for the two communities, including Whale Pass, Deweyville/Sarkar Lake, Stevenson Island, and Ratz Harbor.

Thorne Bay

The extensive road system adjacent to the community provides numerous opportunities for residents to gather firewood, trees to saw into lumber for homebuilding, and access to hunting and fishing areas throughout the Project Area. Some trapping also occurs along the road system and beach fringe areas.

Whale Pass

The extensive road system adjacent to the community provides access to hunting and fishing areas throughout the Project Area. In addition to areas adjacent to the road system, the Naukati/Staney Creek area is used for deer hunting and fishing.

Wrangell

Residents of Wrangell used areas adjacent to the major road system and beach fringe within the Project Area for deer hunting, according to the TRUCS survey and the Wrangell Harvest Study (Cohen 1989).

Other Communities

In addition to those already discussed, the following are other communities that use the Project Area for subsistence gathering purposes: Edna Bay (the west coast beach fringe areas), Hyder (areas adjacent to the road system near Control Lake, Staney Creek, Logjam Creek and Luck Lake), Klukwan (Coffman Cove, Luck Lake and the Sweetwater Lake areas), Metlakatla (areas adjacent to the road system particularly in the Sandy Beach, Control Lake, Staney Creek, Sarkar Lake, Naukati and Whale Pass areas), Meyers Chuck (areas adjacent to the road system, Ratz Harbor and the Thorne Bay area), Labouchere Bay (the same areas identified by Point Baker and Port Protection residents), Naukati (the same areas identified by residents of Whale Pass, Coffman Cove and Klawock), and Saxman (areas adjacent to the road system for deer hunting and Hatchery Creek, for subsistence fishing for sockeye salmon). These communities were not considered to have high subsistence use of the area based on ADF&G deer harvest data (see Table 3-70, later in this section), and were not analyzed in detail in this EIS.

Table 3-67 presents information taken from the 1988 TRUCS report, summarizing the importance of subsistence use for individual communities using the Project Area.

Table 3-67
Per Capita Subsistence Harvest for Rural Communities Using the Project Area and Other Lands for Subsistence Gathering Activities, in Pounds

Community	Total Harvest	Deer	Other Mammal	Salmon	Other Fish	Shell-fish	Misc
Coffman Cove	186	60	1	52	56	10	7
Craig	185	41	9	40	63	26	7
Hollis	164	38	9	44	36	27	11
Hydaburg	337	43	8	137	83	52	14
Kasaan	189	40	2	32	33	72	6
Klawock	239	35	15	69	58	28	20
Petersburg	200	44	19	45	46	35	18
Point Baker	345	89	30	89	68	49	23
Port Prot.	311	40	3	112	92	47	6
Thorne Bay	188	37	6	48	75	19	14
Whale Pass	186	50	19	41	38	34	6
Wrangell	164	20	24	30	43	41	7

SOURCE: TRUCS 1988

All 12 communities included in the analysis harvested more than 150 pounds of subsistence resources per capita in 1987. Three communities—Hydaburg, Pt. Baker, and Pt. Protection—harvested more than 300 pounds per capita. Klawock and Petersburg residents harvested 239 and 203 pounds per capita respectively.

Figure 3-34
Subsistence Harvest as Percent of Meat and Fish Consumed

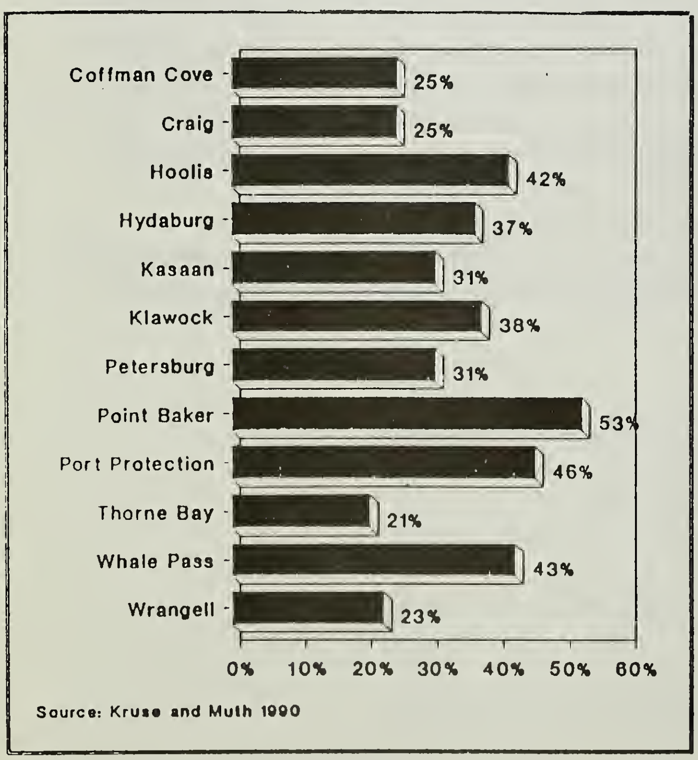
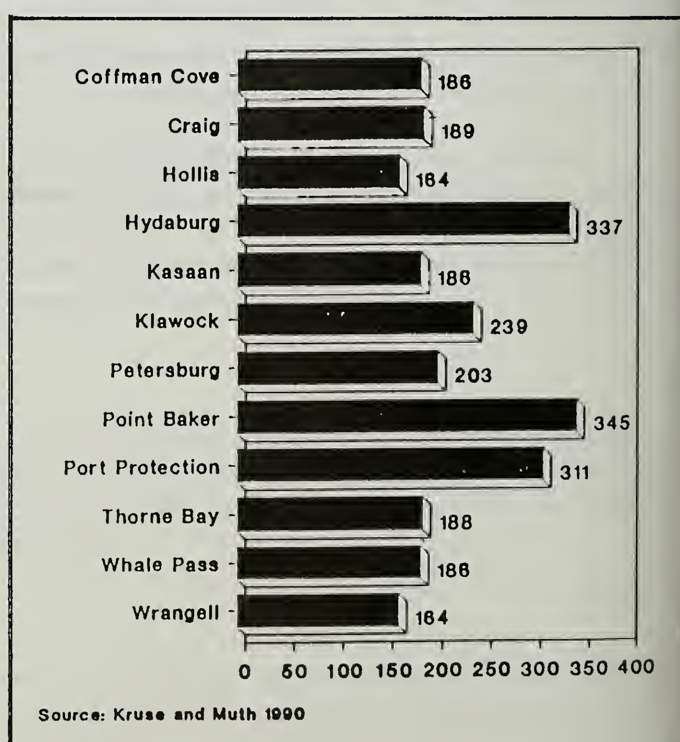


Figure 3-35
Pounds of Edible Subsistence Harvest Per Capita by Community



On average, households in all communities included in the analysis derived a quarter or more of the meat and fish they ate in 1987 from their own subsistence harvest. Point Baker, Port Protection, Whale Pass, and Hollis residents reported on average that more than 40 percent of their meat and fish came from their own subsistence harvest.

Affected Resources

The Project Area supports a wide variety of resources that contribute to the maintenance of the subsistence lifestyle. Identified activities include harvest of fish, waterfowl, bear, deer, furbearers, clams, crabs, and shrimp; and the gathering of berries and seaweed. In addition, many residents use trees for firewood and lumber. Of these resources, salmon and trout, furbearers, bear, and deer may potentially be most affected by the CPOW project.

Fish

Salmon and trout are the principal subsistence fish resources in the affected area. Pacific salmon, with the exception of chinook (king), are harvested in both fresh and salt water in a variety of ways throughout the year (king salmon are not present in freshwater within the Project Area). The sockeye salmon is probably the most important subsistence species because of its high quality flesh and ease of harvest at traditional sites.

Traditional harvest sites for principal salmon species within the Project Area include:

Sockeye	Coho
Snakey Lakes Falls	North Thorne River Falls
Karta Falls	Upper and Lower Logjam Falls
Hatchery Creek Falls	Big Creek (108 Creek) Falls
Deweyville/Sarkar Lake Area	

Table 3-68 lists the stream, number of subsistence permits issued, and the number of fish taken by species for subsistence purposes. This table shows that the Deweyville/Sarkar area, Karta River, and Hatchery Creek are the major salmon subsistence streams.

Table 3-68
Salmon Subsistence Permits and Harvest 1989-91

Location	Permits Issued	Chinook	Salmon Sockeye	Taken Pinks	Chums	Coho
1989						
Deweyville	10	0	77	0	10	10
Hatchery Creek	46	0	347	0	4	5
Karta River	130	0	1,607	20	1	9
Sarkar	83	17	1,134	9	0	13
Thorne River	6	0	50	0	0	2
1990						
Deweyville	32	0	382	0	0	0
Hatchery Creek	74	0	641	0	0	11
Karta River	116	0	1,219	6	0	9
Sarkar	9	0	100	0	0	0
Thorne River	14	0	131	116	0	0
1991						
Deweyville	43	0	676	0	0	1
Hatchery Creek	108	0	1,068	0	0	0
Karta Creek	41	0	370	3	4	1
Sarkar	15	0	197	0	0	0
Thorne River	4	0	58	0	0	0

Source: ADF&G Commercial and Subsistence harvest data.

Table 3-69
Location of Subsistence Use Fish Permits by Community.

Community	Deweyville	Hatchery Creek	Karta River	Sarkar	Thorne River
Coveman Cove		X		X	
Craig	X	X	X	X	
Hollis		X	X	X	X
Hydaburg			X		
Kasaan			X		
Klawock	X	X	X	X	
Petersburg					
Point Baker					
P. Protection					
Thorne Bay	X	X	X	X	X
Whale Pass	X	X		X	
Wrangell					

Deer

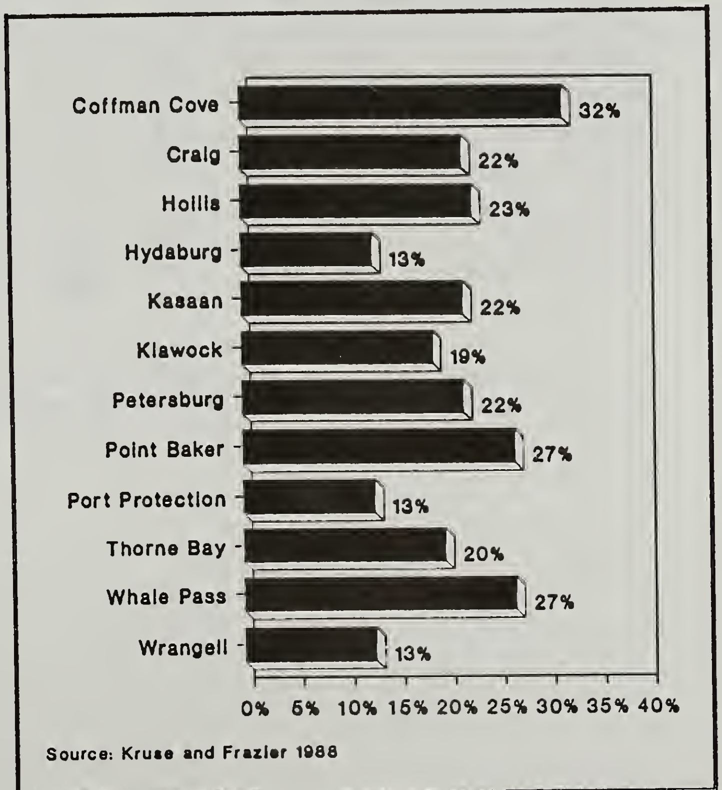
For record-keeping purposes, the ADF&G has broken its Game Management Units into smaller areas called Minor Harvest Areas (MHA), which are synonymous with the Wildlife Analysis Areas (WAA's) used by the Forest Service. Table 3-41, in the Wildlife section of this chapter, displays the Project Area VCU's located in the various Wildlife Analysis Areas.

The Sitka black-tailed deer is an important subsistence species found throughout the Project Area. Deer populations on Prince of Wales Island are now moderately high following a decline in the 1970's. The general hunting season is August through late December. Harvest is generally concentrated during two time periods: the first few weeks of the season in August, and later in November when the rut occurs. Although most of the early deer harvest occurs from or near a timber harvest access road (Mankowske 1985), a significant harvest effort is directed toward traditional alpine areas where deer, especially bucks, are concentrated during August. Traditional harvest areas within the Project Area that are accessible by foot through old-growth stands include:

- Control Lake Mountains
- Kogish Mountain
- Ratz Mountain
- Trumpeter Mountain
- Twin Mountain (Staney)

Figure 3-36

Deer Harvest as Percent of Total Pounds of Subsistence Harvest, by Community



In 1987, deer constituted between 13 and 32 percent of the total subsistence harvest on average for households in Coffman Cove, Craig, Hollis, Hydaburg, Klawock, Kasaan, Petersburg, Point Baker, Port Protection, Thorne Bay, Whale Pass, and Wrangell.

Table 3-70
Average Deer harvest by Community*, by Project Area WAA's, 1987-90

Community	1315	1319	1420	1421	1422	1527	1530	Total
Coffman Cove	0	4	49	40	7	6	0	106
Craig	4	47	0	40	71	8	7	177
Edna Bay	0	0	0	0	0	0	0	0
Hollis	3	1	5	7	2	1	1	20
Hydaburg	0	13	5	3	3	0	0	24
Kasaan	3	0	0	0	0	0	0	3
Ketchikan	41	34	68	142	134	46	53	518
Klawock	0	19	7	21	35	5	0	87
Labouchere Bay	0	0	0	0	2	0	0	2
Metlakatla	0	1	0	0	1	1	1	4
Meyers Chuck	2	0	0	0	0	0	0	2
Naukati	0	0	0	0	5	0	0	5
Petersburg	4	7	10	10	9	23	5	68
Point Baker	0	0	0	0	0	0	1	1
Polk Camp	1	0	0	0	0	0	0	1
Port Protection	0	0	0	0	0	0	0	0
Saxman	0	0	0	0	0	0	0	0
Thorne Bay	85	138	14	30	47	3	2	319
Whale Pass	0	3	0	1	1	9	18	32
Wrangell	0	6	6	0	1	10	48	71
Outside Alaska	1	2	0	3	3	9	0	18
Total Sub	102	239	96	152	184	67	82	922
Total Non-sub	42	36	68	145	137	55	53	536
TOTAL Harvest	144	275	164	297	321	122	135	1,458

*Includes additional communities as discussed in Affected Areas, earlier in this section.
SOURCE: Matson 1992. Data derived from ADF&G harvest data.

Table 3-71
Habitat Capability Compared to Demand for Sitka Black-tailed Deer, by Wildlife Analysis Area (WAA), in Numbers of Deer

WAA	Total Average Harvest 1987-90	Population Needed to Support Total Harvest*	Total Average Subsistence Harvest 1987-90	Population Needed to Support Subsistence Harvest*	1990 Habitat Capability**	1954 Habitat Capability**
1315	144	1,440	102	1,020	2,838	3,780
1319	275	2,750	239	2,390	2,857	3,495
1420	164	1,640	96	960	1,035	1,718
1421	297	2,970	152	1,520	3,073	3,733
1422	321	3,210	184	1,840	4,412	5,717
1527	122	1,220	67	670	1,730	2,027
1530	135	1,350	82	820	1,861	2,587
Total	1,458	14,580	922	9,220	17,806	23,057

*Population needed to support harvest assumes a 10 percent harvest of the population as recommended by Flynn and Suring (1989).
**Harvest and habitat capability for whole WAA's.
SOURCE: Matson 1992. Data derived from CPOW GIS data base, Suring 1988, and ADF&G harvest data.

Based on Table 3-71, habitat capabilities for Sitka black-tailed deer do not appear high enough to support the average level of harvest for 1987-1990 in WAA 1420. Current harvest levels in WAA's 1319 and 1421 appear to be very close to habitat capability (based on harvesting 10 percent of the population). Habitat capability does appear adequate to meet current subsistence demand in all Project Area WAA's. Since subsistence use has priority over nonsubsistence users, at some time in the future it may be necessary for the Federal Subsistence Board to restrict the number of deer harvested by nonrural hunters in order to leave adequate numbers of deer for subsistence users.

Table 3-72
Average Deer Harvest by Community, 1987-1990, and Percent of Total Harvest that Occurred in Project Area WAA's

Community	Ave. Deer Harvest Project Area WAA's	Ave. Deer Harvest All Areas	Percent of Harvest in Project Area WAA's
Coffman Cove	106	131	81
Craig	177	641	28
Hollis	20	39	51
Hydaburg	24	60	40
Kasaan	3	5	60
Ketchikan	518	1,733	30
Klawock	87	275	32
Petersburg	68	1,311	5
Point Baker	1	30	3
Port Protect.	0	7	0
Thorne Bay	319	367	87
Whale Pass	32	45	71
Wrangell	71	351	20

SOURCE: Matson 1992. Data derived from ADF&G harvest data.

Coffman Cove and Thorne Bay appear to be the most dependent on the Project Area for its deer harvest, deriving over 80 percent of their total harvest from the Project Area for the years 1987 through 1990. Ketchikan accounted for the greatest number of deer harvested within the Project Area, which amounted to 30 percent of that community's total deer harvest. Craig, Hollis, Hydaburg, Kasaan, Klawock, and Whale Pass also harvest a large percentage (28 to 71 percent) of their average deer harvest from the Project Area.

Black Bear

The TRUCS effort indicated that some black bear harvest was associated with subsistence use, but that community use varies widely. The ADF&G has gathered harvest data for many years; however, data is not available by community. The only data available to help distinguish between rural and nonrural harvest are records kept by ADF&G that separate the resident harvest from nonresident harvest. In GMU 2 since the 1985-86 bear season, 596 bears were harvested by Alaska residents and 510 were harvested by nonresidents. This amounts to 54 percent of the bears being harvested by Alaska residents, 46 by nonresidents. Of the 54 percent attributable to Alaska residents, a percentage was harvested by residents of communities that are classified as nonrural. Assuming that the nonrural bear harvest is similar to the nonrural deer harvest (37 percent), approximately 38 percent of the bears are harvested by rural residents.

Table 3-73 displays the black bear harvest by WAA by year. It appears that the recent harvest level is close to the current habitat capability for the Project Area. There may be some over-harvest of black bear in WAA's 1315, 1420, and 1527.

Table 3-73
Black Bear Harvest and Habitat Capability by Year, in Numbers of Bears

AA**	1986	1987	1988	1989	1990	1991	Average Harvest Per Year	Population Needed to Support Harvest*	1990 Habitat Capability
1315	16	10	9	12	19	11	13	130	101
1319	4	6	4	7	10	14	8	80	175
1420	5	5	4	13	9	17	9	90	65
1421	5	5	2	1	2	5	4	40	158
1422	24	19	12	14	22	16	18	180	206
1527	19	21	25	21	5	10	17	170	74
1530	0	0	0	0	2	11	2	20	100
TOTAL	73	6	56	68	69	84	71	710	879

*Population needed to support harvest assumes a 10 percent harvest of the population. (D.Larsen, ADF&G, pers. comm.)
**Includes entire WAA, including portions outside the Project Area
SOURCE: Matson 1992. Data derived from ADF&G harvest data.

Waterfowl

A variety of species of ducks, along with Canada geese, are widely hunted in the Project Area, primarily along bays and estuaries. Identified sites with a history of high use that are within the Project Area include:

- Big Creek
- Grassy Flats (Coveman Cove)
- Gold and Galligan Lagoon
- Coffman Cove Estuary
- Staney Creek Estuary
- Salt Chuck (Lake Ellen)
- Thorne River Estuary

Furbearers

Furbearer harvest supplements the seasonal income of many area residents, most of whom are subsistence users. Different levels of trapping intensity exist, from the ccasional trapper who targets primarily marten and beaver close to the road system, to those individuals pursuing all furbearers both near to and far from the road system. Harvest effort usually is concentrated along the salt water-upland interface, and near or along major river systems. Martens appear to be the most old-growth associated of the furbearers, and are trapped intensively in old-growth areas adjacent to the road system.

Tables 3-74 and 3-75 display the marten and river otter harvest by WAA. There are wide yearly variations in harvest levels. These tables show that recent harvest levels of marten and river otter are well within the current habitat capabilities of the Project Area. Numbers derived from habitat capability models for marten do not take into account road densities and the resulting increase in harvest pressure.

Table 3-74
Marten Harvest and Habitat Capability, by WAA, in Numbers of Marten

WAA	84-85	85-86	86-87	87-88	88-89	89-90	Average Harvest per Year	Pop Needed to Support Harvest*	1990 Habitat
1315	26	2	23	64	28	19	27	34	115
1319	34	27	6	46	53	49	36	45	165
1420	30	0	5	71	41	67	37	45	54
1421	72	3	2	69	19	38	34	43	174
1422	70	47	6	69	114	75	64	80	206
1527	22	42	15	65	19	27	32	40	69
1530	0	0	0	0	0	0	0	0	107
TOTAL	254	121	57	384	274	275	230	287	890

*Population needed to support harvest assumes a 200 percent increase in population between winter and fall, and a 40 percent harvest of the fall population. The marten odel calculates the winter habitat capability.
SOURCE: Matson 1992.

Table 3-75
River Otter Harvest 1984-1990, in Numbers of Otter

WAA	84-85	85-86	86-87	87-88	88-89	89-90	Average Harvest per Year	Pop Needed to Support Harvest*	1990 Habitat Capability
1315	10	4	0	7	-	1	5	13	54
1319	5	11	2	11	-	0	6	15	38
1420	12	5	0	0	-	0	4	10	16
1421	6	2	0	4	-	4	4	10	47
1422	18	1	0	36	11	0	11	28	74
1527	2	38	15	16	4	0	13	33	28
1530	0	0	0	0	0	0	0	0	48
TOTAL	53	61	17	74	15	5	43	109	305

*Population needed to support harvest assumes a 40 percent harvest of the population.

Firewood and Lumber

Use of both live and dead timber occurs thoughout the Project Area. Most homes use firewood as the principal heat source because of the great abundance of dead and downed timber. Use of green timber, milled from free-use standing timber, is extensive and expected to increase as the population increases.

Other Uses

Many other subsistence uses of the natural resources occur. Some examples are berry picking, mushroom gathering, use of native plants for arts and crafts, collecting of other edible plants and animals, collection of peat and seaweed for gardens, and use of sand, gravel and rock for building purposes. Most of these activities are not associated with a particular site, but rather occur throughout the Project Area.

CPOW Areas Ever Used for Deer Hunting

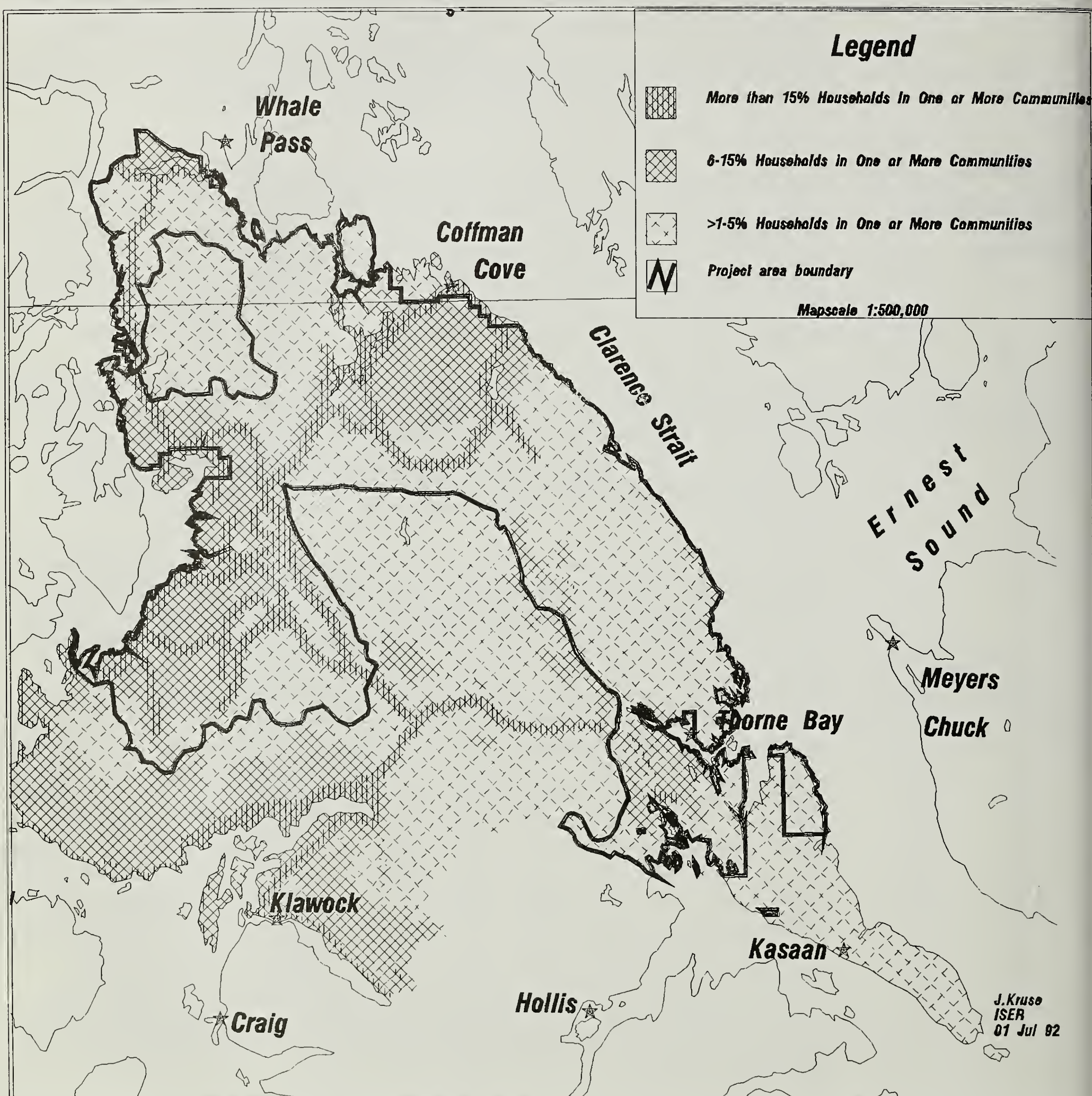
Jack Kruse, University of Alaska, Anchorage, Institute of Social and Economic Research, mapped the percentage of households that ever hunted the area for deer and calculated the acreage within the Project WAA's used by 15 percent or more of the households in each community (Table 3-80, later in this section). Maps are available in the Planning Record showing the percentage of households ever using the Project Area and surrounding areas for deer hunting, by community. These figures also display existing roads and past cutting areas. Use patterns vary greatly by community.

Results displayed in Table 3-80, show that Coffman Cove, Craig, Klawock and Thorne Bay residents utilize the most acres within the Project Area WAA's. Port Protection, Point Baker, Hydaburg, Petersburg, and Wrangell residents appear to focus most of their deer hunting outside the Project Area WAA's. Table 3-80 also includes a Summary of Analysis of Changes in Land-Use, which displays the acres used for subsistence deer hunting that will be harvested or have a road built.

Another method to determine the importance of the Project Area to a subsistence community is to determine the number of deer harvested from the Project Area WAA's and compare that to the total number of deer harvested by that community. Thorne Bay and Coffman Cove harvested more than 80 percent of their deer from the Project Area (Table 3-72). Klawock residents heavily use the road system and to a lesser extent coastal areas, most of which are located outside the project WAA's. Coffman Cove residents use a relatively small section of the road system and surrounding areas, or areas along the coast. Craig resident hunting patterns are more dispersed: within the road system from Control Lake to Sarkar Lakes, including the Staney Creek area for deer hunting. Thorne Bay residents primarily use areas within the Project Area WAA's that can be accessed by road for deer hunting. Kasaan resident use is concentrated along the coast near Salt Chuck and Karta Bay of Kasaan Bay and upland behind the community. Most deer hunting by Hollis residents occurs outside the Project Area WAA's. Within the Project Area, Hollis hunting occurs primarily south of Coffman Cove. Whale Pass residents concentrate their deer hunting activity within the project WAA's along the road system near their community. Point Baker and Port Protection residents do not use the Project Area heavily. There is some minor use along the coast and the road system in the Sarkar Lakes vicinity. Small percentages of Hydaburg residents report using the entire Project Area. Significant use, however, appears to be limited to the road system between Klawock and Coffman Cove.

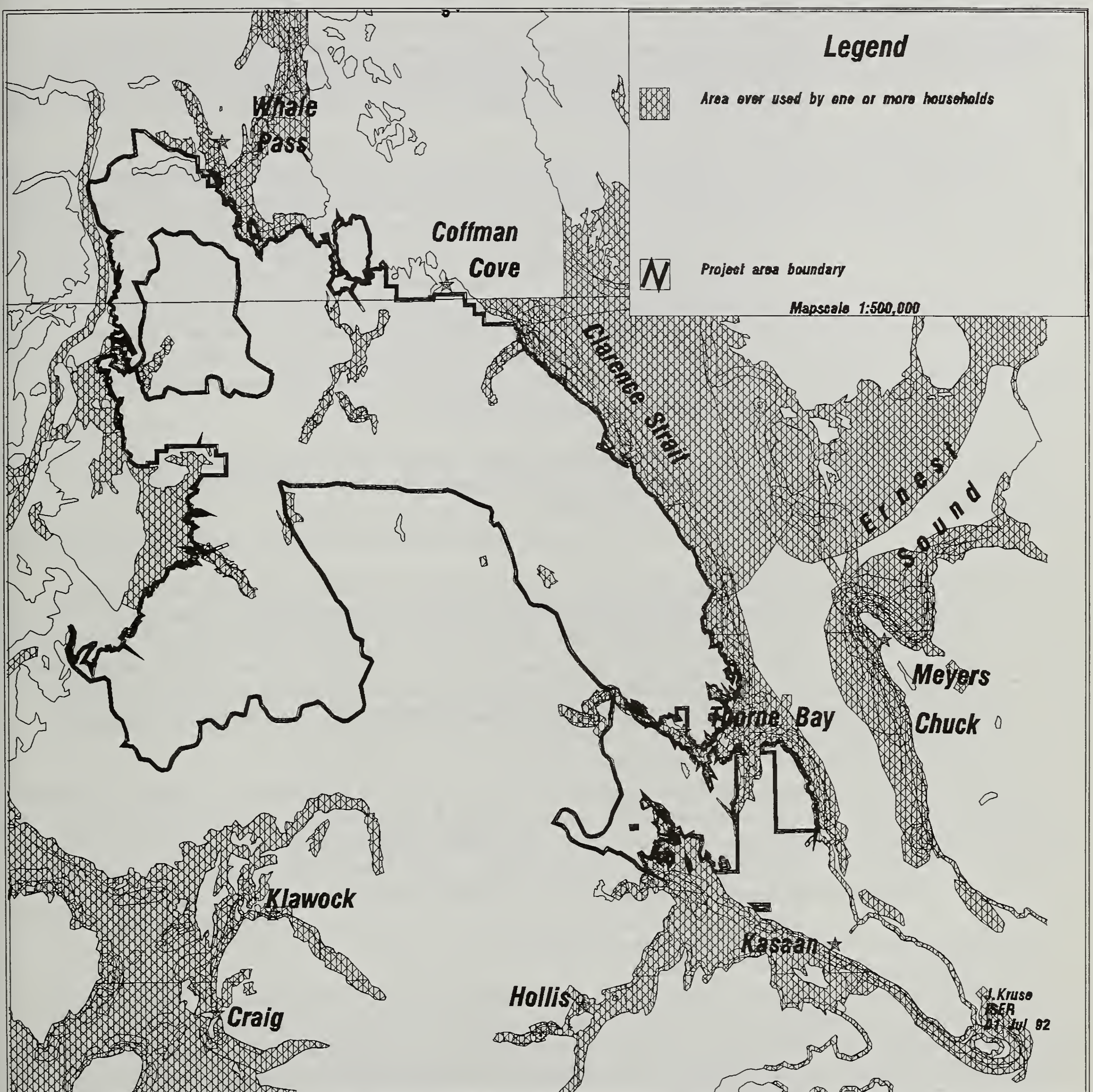
Figures 3-37 and 3-38 illustrate areas in CPOW where households have ever hunted deer or fished for salmon.

Figure 3-37
CPOW Areas Where Households Have Ever Hunted Deer



SOURCE: J.Kruse, ISER, 1992.

Figure 3-38
CPOW Areas Where Households Have Ever Fished for Salmon



SOURCE: J.Kruse, ISER, 1992.

Effects of the Alternatives

Introduction

Section 810 of the Alaska National Interest Lands Conservation Act (ANILCA) requires a Federal agency having jurisdiction over lands in Alaska to evaluate the potential effects of proposed land-use activities on subsistence uses and needs. Section 810 of ANILCA states:

> "In determining whether to withdraw, reserve, lease, or otherwise permit the use, occupancy, or disposition of public lands under any provision of law authorizing such actions, the head of the agency having primary disposition over such lands or his designee shall evaluate the effects of such use, occupancy, or disposition on subsistence uses and needs, the availability of other lands for purposes sought to be achieved, and other alternatives which would reduce or eliminate the use, occupancy, or disposition of public lands needed for subsistence purposes. No such withdrawal, reservation, lease, permit, or other use, occupancy or disposition of such lands which would significantly restrict subsistence uses shall be effected until the head of such federal agency:
>
> 1. gives notice to the appropriate state agency and appropriate local committees and regional councils established pursuant to ANILCA Section 805;
>
> 2. gives notice of, and holds, a hearing in the vicinity of the area involved; and
>
> 3. determines that (A) such a significant restriction of subsistence uses is necessary and consistent with sound management principles for the utilization of the public lands; (B) the proposed activity will involve the minimal amount of public lands necessary to accomplish the purposes of such use, occupancy, or other disposition; and (C) reasonable steps will be taken to minimize adverse impacts upon subsistence uses and resources resulting from such action."

This section evaluates how the proposed action alternatives could affect subsistence resources used by the rural communities in the Central Prince of Wales Project Area, including: Coffman Cove, Craig, Hollis, Hydaburg, Kasaan, Klawock, Petersburg, Point Baker, Port Protection, Thorne Bay, Whale Pass, Wrangell, and the nonrural community of Ketchikan. The subsistence resource categories evaluated are deer, furbearers, waterfowl, black bear, marine mammals, salmon, other finfish, shellfish, other food resources, and firewood.

Criteria used to evaluate the effects of the proposed alternatives are: (1) changes in abundance or distribution of subsistence resources; (2) changes in access to subsistence resources; and (3) changes in competition from nonsubsistence users for those resources. The evaluation determines whether subsistence opportunities in the Project Area or portions of the Project Area may be significantly restricted by any of the proposed action alternatives. To determine this, the evaluation: (1) considers the availability of subsistence resources in the surrounding areas; (2) considers the cumulative impacts of past and foreseeable future activities on subsistence users and resources; (3) looks at potential cultural and socioeconomic implications affecting subsistence users; and (4) focuses on the mapped subsistence use area in the Project Area.

The evaluation relies heavily upon the use of wildlife habitat capability models as well as upon ADF&G hunter survey data.

The discussion of abundance, distribution, access, competition, and cumulative effects for deer appears as a separate section. The remaining resources and a summary of findings are treated under the headings of Abundance and Distribution, Access, Competition, and Cumulative Effects.

This subsistence evaluation considers, with distinct findings by alternative and by resource category, whether or not there is a significant possibility of a significant restriction of subsistence use. The Alaska Land Use Council's definition of "significantly restrict subsistence use" is one guideline used in the findings. By this definition:

> "A proposed action shall be considered to significantly restrict subsistence uses, if after any modification warranted by consideration of alternatives, conditions, or stipulations, it can be expected to result in a substantial reduction in the opportunity to continue subsistence uses of renewable resources. Reductions in the opportunity to continue subsistence uses generally are caused by: reductions in abundance of, or major redistribution of resources; substantial interference with access; or major increases in the use of those resources by nonrural residents. The responsible line officer must be sensitive to localized, individual restrictions created by any action and make his/her decision after a reasonable analysis of the information available."

The U.S. District Court Decision of Record in Kunaknana v. Watt provided additional definitions of "significant restriction of subsistence uses" and are also used as guidelines in the findings. The definitions from Kunaknana v. Watt include:

> "Significant restrictions are differentiated from insignificant restrictions by a process assessing whether the action undertaken shall have no or slight effect as opposed to large or substantial effects. In further explanation the Director (BLM) states that no significant restriction results when there would be "no or slight" reduction in the abundance of harvestable resources and no occasional redistribution of these resources. There would be no effect (slight inconvenience) on the ability of harvesters to reach and use active subsistence harvesting site; and there would be no substantial increase in competition for harvestable resources (that is, no substantial increase in hunting by nonrural residents)."

Conversely, restrictions for subsistence uses would be significant if there were large reductions in abundance or major redistribution of these resources, substantial interference with harvestable access to active subsistence-use sites or major increases in nonrural resident hunting. In light of this definition, the finding of significant restriction must be made on a reasonable basis, since it must be decided in light of the total subsistence lands and resources that are available to individuals in surrounding areas living a subsistence lifestyle. The Draft EIS evaluates the availability of subsistence resources in surrounding areas that could be accessed without undue risk or economic hardship to subsistence users.

Subsistence Use Areas

Specific areas within the Central Prince of Wales Project Area are more important for harvesting subsistence resources. Figures 3-37 and 3-38 (earlier in this section) depict CPOW regional harvest of deer and salmon. The subsistence use areas depicted on these maps were developed from the TRUCS data base by J. Kruse. Only rural communities were surveyed by TRUCS, therefore use of the Project Area by Ketchikan

residents is not depicted. The salmon harvest map (Figure 3-38) has areas highlighted where one or more households have ever harvested the resource. The deer harvest map (Figure 3-37) depicts three intensities of use: where more than 15 percent of households in one or more communities have ever harvested deer, where 6–15 percent of households in one or more communities have ever harvested deer, and where 1–5 percent of households in one or more communities have ever harvested deer. The heaviest deer harvest use is concentrated along areas where logging roads provide access to the Project Area.

The areas of most subsistence use are the areas adjacent to existing road systems, the beaches, and the areas in close proximity to communities. Within the Project Area, the extent and location of the subsistence use area precludes complete avoidance. Areas other than subsistence use areas that could be harvested may be limited by other resource concerns such as: soil and water protection; high value wildlife habitat; economics; visuals; or unit and road design. Effort was taken to protect the highest value subsistence areas. For example, beach fringe is one of the highest use subsistence areas, and none will be harvested under any of the proposed alternatives.

Much of the data in this section is analyzed by Wildlife Analysis Areas (WAA'S), management units delineated by the Alaska Department of Fish and Game and used by the Forest Service. WAA's that are partly within the Project Area are 1315, 1319, 1420, 1421, 1422, 1527, and 1530 (see Figure 3-18, in the Wildlife Section of this chapter). For a list of all the VCU's within WAA's, see Table 3-41, in the Wildlife section.

Direct, Indirect, and Cumulative Effects on Deer

Deer: Abundance and Distribution

Table 3-76 shows the average deer harvest for 1987 through 1990 for Project Area WAA's by rural and nonrural communities, and shows percent of the WAA's harvested by rural and nonrural communities. It is assumed that the 1987–1990 average deer harvest reflects rural and nonrural community use of deer in Project Area WAA's. ADF&G has collected deer harvest data for individual WAA's only since 1987. Averaging the deer harvest makes allowance for factors which influence deer numbers and hunting activity from year to year, such as weather patterns, access, habitat capability, and hunting success. Nonrural residents harvest 29–49 percent of the deer from all WAA's, except 1319, which is 13 percent. Most of the nonrural harvest (97 percent) is from Ketchikan residents. Overall nonrural residents harvest 37 percent of the deer from the Project Area.

Deer are an important subsistence resource used by the rural communities in the vicinity of the CPOW Project Area. In Table 3-77 of this section, it is estimated that deer in WAA 1420 are currently being harvested at levels greater than the estimated habitat capability can sustain on a continued basis (assuming 10 percent harvest of the population). WAA's 1319 and 1421 have a habitat capability that is essentially equal to the population needed to support subsistence and sport hunting harvest. The habitat capability for WAA's 1315, 1422, 1527, and 1530 is sufficient to meet current subsistence and sport hunting demands. The habitat capability for all WAA's should be able to sustain the subsistence harvest by rural communities.

Determining what harvest levels are sustainable assumes that habitat capability projections from the deer harvest model reflect an approximation of deer population. Furthermore, it is based on the determination that the sustainable harvest is 10 percent of the deer population (Flynn and Suring 1989).

Table 3-76

Average Deer Harvest for 1987 through 1990 (Project Area WAA's by Rural and Nonrural Communities

WAA	Rural	Nonrural	Total	% Rural	% Nonrural
1315	102	42	144	71	29
1319	239	36	275	87	13
1420	96	68	164	59	41
1421	152	145	297	51	49
1422	184	145	321	57	43
1527	67	55	122	55	45
1530	82	53	135	61	39
Total	922	536	1,458	63	37

SOURCE: Matson 1992. Data derived from ADF&G Deer Hunter Survey Summary Statistics 1987-1990.

Deer abundance in all WAA's except 1420, appears to be sufficient to sustain current levels of use by both rural and nonrural communities under all alternatives. Habitat capability in 1420 is already below what is necessary to sustain the current harvest levels. Alternative 2 decreases habitat capability the most in WAA 1420 (from 1035 down to 1009). Overall for all Project Area WAA's, the current habitat capability is roughly 3,200 higher than the total deer needed from both rural and nonrural communities (Table 3-77).

Table 3-77

Deer Populations Needed to Support Current Average Demand from Rural and Nonrural Communities Compared to Habitat Capability in 1996 (by alternative)

WAA	Pop. Rural Harvest*	Needed Nonrural Harvest*	For Total Harvest*	1993 Habitat Capability*	1996 Habitat Capability** Alt.1	Atl.1a	Alt.2	Alt.3	Alt.4	Alt.5
1315	1,020	420	1,440	2,838	2,838	2,856	2,788	2,793	2,797	2,779
1319	2,390	360	2,750	2,857	2,857	2,857	2,837	2,833	2,836	2,834
1420	960	680	1,640	1,035	1,035	1,050	1,009	1,016	1,018	1,020
1421	1,520	1,450	2,970	3,073	3,073	3,073	3,048	3,017	3,006	3,050
1422	1,840	1,370	3,210	4,412	4,412	4,414	4,291	4,349	4,304	4,274
1527	670	550	1,220	1,730	1,730	1,730	1,730	1.724	1,726	1,724
1530	820	530	1,350	1,861	1,861	1,861	1,840	1,821	1,833	1,848
Total	9,220	5,360	14,580	17,806	17,806	17,841	17,543	17,553	17,520	17,529

* Harvest = number needed to meet demand.

** This habitat capability does not account for activites occurring in these WAA's outside of the Project Area.

SOURCE: Matson 1992. Data derived from ADF&G Hunter Survey Summary Statistics 1987-1990.

Deer: Reasonably Forseeable Future Actions

Table 3-78 displays the effect of harvesting CPOW and another harvest entry which is equal to the amount harvested by each action alternative; this is assumed to be the reasonably foreseeable future harvest volume.

Table 3-78

Deer Populations Needed to Support Current Average Harvest to Meet Demand from Rural and Nonrural Communities compared to Habitat Capability in 2004 (by alternative)

WAA	Pop. Rural Harvest*	Needed Nonrural Harvest*	For Total Harvest*	1993 Habitat Capability**	2004 Habitat Capability** Alt.1	Alt.1a	Alt.2	Alt.3	Alt.4	Alt.5
1315	1,020	420	1,440	2,838	2,838	2,856	2,738	2,748	2,756	2,720
1319	2,390	360	2,750	2,857	2,857	2,857	2,817	2,809	2,815	2,811
1420	960	680	1,640	1,035	1,035	1,050	983	997	1,001	1,005
1421	1,520	1,450	2,970	3,073	3,073	3,073	3,023	2,961	2,939	3,027
1422	1,840	1,370	3,210	4,412	4,412	4,414	4,170	4,286	4,196	4,136
1527	670	550	1,220	1,730	1,730	1,730	1,730	1.718	1,722	1,718
1530	820	530	1,350	1,861	1,861	1,861	1,819	1,781	1,805	1,835
Total	9,220	5,360	14,580	17,806	17,806	17,841	17,280	17,300	17,234	17,252

* Harvest = number needed to meet demand

** This habitat capability does not account for activites occurring in these WAA's outside of the Project Area.

SOURCE: Matson 1992. Data derived from ADF&G Hunter Survey Summary Statistics 1987-1990.

Deer: Access

Access to traditional subsistence-use areas may be affected where logging activities take place near the beach fringe, because traditional subsistence access is by boat to the beaches of the Project Area. The effect on access would probably be minor under all alternatives since no beach fringe will harvested in the Project Area and no marine or estuarine habitat will be directly affected by logging activities.

New and rebuilt roads will provide access to areas that were not previously used for subsistence harvest of deer. Miles of road proposed for construction are shown in Figure 2-6, in Chapter 2. Road access would favor harvest by residents who live in communities connected to the road system or who bring a vehicle to Prince of Wales Island on the ferry.

Road closures and other management prescriptions developed for Project Area roads will be the same as those specified in Option B in the 1989-94 LTS EIS.

Deer: Competition

Competition for subsistence resources in the CPOW Project Area is an issue to residents of Prince of Wales Island. Residents are concerned with competition from residents of Ketchikan, mostly because of the numbers of people that come to the Island via the ferry. Since Ketchikan residents are considered nonrural, this

competition can be regulated if it starts to restrict nonrural residents' ability to obtain subsistence resources.

Table 3-70,earlier in this section, shows the distribution of deer harvest in Project Area WAA's among rural and nonrural communities. Data indicate there is competition with nonrural hunters. Over 40 percent of the deer are harvested by nonrural hunters in WAA's 1420, 1421, 1422 and 1527. This reflects competition by Ketchikan residents. Deer habitat capability in WAA 1420 is presently below the level considered adequate to sustain current rural and nonrural harvest. Deer habitat capability in all WAA's is presently adequate to sustain current subsistence harvest (Table 3-77).

The Federal Subsistence Board may use its authority to regulate nonrural harvest of deer and has authority to prioritize the harvest of deer among rural residents when necessary to protect the resource. This type of action, as prescribed by ANILCA, Section 804, may be necessary to ensure the availability of adequate abundance of deer needed by the rural communities using the Project Area whether or not the proposed actions are implemented. The current deer population level does not necessarily require restrictions on nonrural users.

Individual household use of specific areas may be displaced by some of the proposed actions. There is not sufficient information available nor would it be practical to evaluate displacement potential for individual households. The Project Area's accessibility makes it very unlikely that an individual household or even an entire community is highly dependent on specific areas within the Project Area that may be affected by proposed alternatives. The known uses of the Project Area by individual communities is discussed earlier in this section.

Because there may be a restriction on subsistence use of deer, Figures 3-39 through 3-47, later in this section, display the availability of deer within the area used by specific communities. The evaluation indicates that for most communities there is adequate deer abundance within the area historically used by residents of each community to meet subsistence needs. Any displacement that may occur is likely to be to other areas within a household's or community's historical range. Furthermore, any displacement that may occur would likely be temporary until activities within the Project Area conclude in three to five years.

Deer: Cumulative Impacts

Cumulative impacts of CPOW Alternatives are determined by calculating the effect on habitat capability after regeneration in clearcut units enters the closed canopy stage and shadeout understory plants and forbs. To determine the cumulative impacts for the reasonably foreseeable future, it is assumed that the next timber entry will be about the same size as CPOW (270 MMBF, see Appendix A); doubling the impacts of Alternative 4 (the closest in volume to 270 MMBF) was used to predict the total cumulative impacts for the reasonably forseeable future. These impacts are displayed in Table 3-79.

The projected number of deer available for harvest in the year 2040 will be sufficient to meet both current subsistence and nonsubsistence demands in WAA's 1315, 1319, 1422, 1527, and 1530. The projected number of deer available for harvest will be sufficient to meet projected subsistence demands only in WAA's 1420 and 1421.

Table 3-79
Deer Populations Needed to Support Current Average Demand from Rural and Nonrural Communities compared to Habitat Capability in 2040 (by alternative)

WAA	Pop. Rural Harvest*	Needed Nonrural Harvest*	for Total Harvest*	1993 Habitat Capability**	2040 Habitat Capability** Alt.1	Alt.1a	Alt.2	Alt.3	Alt.4	Alt.5
1315	1,020	420	1,440	2,838	2,838	2,856	2,638	2,660	2,660	2,610
1319	2,390	360	2,750	2,857	2,857	2,857	2,795	2,783	2,795	2,785
1420	960	680	1,640	1,035	1,035	1,050	941	979	977	973
1421	1,520	1,450	2,970	3,073	3,073	3,073	3,001	2,903	2,873	3,007
1422	1,840	1,370	3,210	4,412	4,412	4,414	4,008	4,198	4,046	3,962
1527	670	550	1,220	1,730	1,730	1,730	1,730	1.714	1,720	1,712
1530	820	530	1,350	1,861	1,861	1,861	1,797	1,731	1,773	1,823
Total	9,220	5,360	14,580	17,806	17,806	17,841	16,910	16,968	16,844	16,872

SOURCE: Matson 1992. Data derived from ADF&G Hunter Survey Summary Statistics 1987-1990.
* Harvest = number needed to meet demand.
** This habitat capability does not account for activites occurring in these WAA's outside of the project area.

A measure of the relative impact by alternative to subsistence uses can be ranked by totaling the acres proposed for harvest that are used for subsistence by more than 15 percent of community households, Table 3-80. The resulting ranking, from lowest impact to highest impact, by alternative is 1/1a, 3, 4, 5, and 2.

Table 3-80
Acreage Used by More than 15 percent of Rural Community Households for Deer Hunting, and Acres Proposed for Timber Harvest or Road Construction, by Alternative and Community

Rural Community	Acres Used by Community Households	Acres Cut or Roaded	Acreage Proposed for Harvest or Road Construction by Alternative 1	1a	2	3	4	5
Coffman Cove	37,528	12,096	0	0	1,062	303	1,109	801
Craig	34,582	17,229	0	0	1,223	105	1,082	1,232
Hollis	69	61	0	0	0	0	0	0
Hydaburg	850	163	0	0	112	0	100	125
Kasaan	4,179	646	0	0	40	40	40	62
Klawock	44,435	20,918	0	0	1,511	177	1,369	1,538
Petersburg	0	0	0	0	0	0	0	0
Point Baker	0	0	0	0	0	0	0	0
Port Protection	380	257	0	0	0	0	0	0
Thorne Bay	35,579	17,739	0	0	1,115	189	1,012	1,025
Whale Pass	9,630	3,696	0	0	512	209	445	494
Wrangell	0	0	0	0	0	0	0	0
Total			0	0	5,575	1,023	5,157	5,277

SOURCE: Matson & Kruse 1992. Derived from TRUCS data base using GIS.

The following sections are organized by community. They draw on four types of data presentations: (1) percent of the community's deer harvest that occurred within the Project Area WAA's; (2) tables with analyses of changes in land used for subsistence; (3) figures comparing the projected number of deer available for harvest in Project Area Wildlife Analysis Areas under proposed actions with current demand for deer. Figures 3-39 through 3-47 compare cumulative changes in deer supply and demand for areas which currently contribute 90 percent of the deer harvested by a community; and (4) the habitat capability of WAA's used by each community taking into account impacts from the proposed alternatives and the reasonably foreseeable future.

The first type of data is the percent of community deer harvest that occurs within the Project Area WAA's (Table 3-72, earlier in this section).

The second type of data presentation displays the amount of acreage overlapping between proposed cutting units and roads and areas used for subsistence deer hunting by more than 15 percent of the households in a given community. Table 3-80 summarizes the analysis done for each community, based on maps with detailed analyses for each community which are located in the planning record.

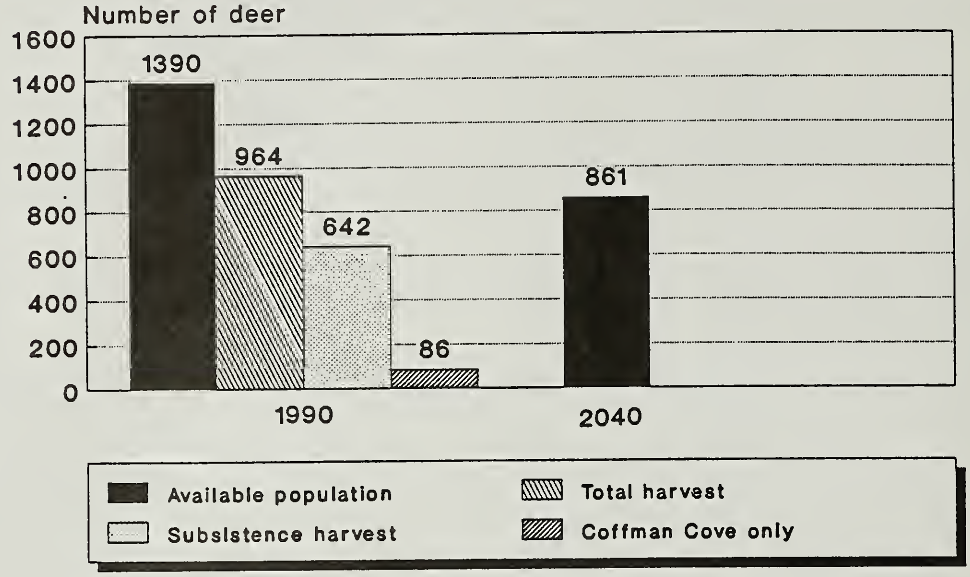
The third type of data presentation compares the estimated supply and demand for deer for the area from which a particular community currently harvests 90 percent of its total deer harvest. These figures show: (1) the estimated effects on the area's ability to support deer populations if the TLMP Draft Revision is implemented; and (2) the estimated demand for deer for the same area, assuming demand remains about the same (harvest numbers in GMU 2 have been fairly constant since a peak in 1987 (see Figure 3-22 in the Wildlife section of this chapter). Figures 3-39 through 3-47 help answer the question of whether the cumulative effects of past activities, proposed actions, and TLMP Draft Revision will reduce the number of deer available at a number below subsistence demands in each community's primary use area. The communities of Petersburg, Point Baker, and Port Protection were not analyzed in this manner due to the limited use of the Project Area for deer hunting (5 percent or less of the deer harvest by these communities occurred within the Project Area WAA's, Table 3-70).

The fourth type of information considered is the habitat capability of WAA's used by each community for harvesting deer, after the impacts of the proposed alternatives and the reasonably foreseeable future actions by the year 2040 (Table 3-79). This represents the total cumulative impacts of these actions.

Coffman Cove

Figure 3-39

Deer Supply and Harvest in all areas used by Coffman Cove Residents



SOURCE: Matson 1992. Based on ADF&G Deer Harvest Data, 1987-90, sorted by WAA and Community, summarized by WAA, ADF&G Division of Subsistence, March 1991.
NOTE: This analysis was conducted only for those WAA's that accounted for 90 percent of the total deer harvest for this community (WAA's 1319, 1420, 1421, 1422, 1527, 1906). Deer Supply was calculated using 10 percent of the estimated deer habitat capability, as recommended by Flynn and Suring (1989).

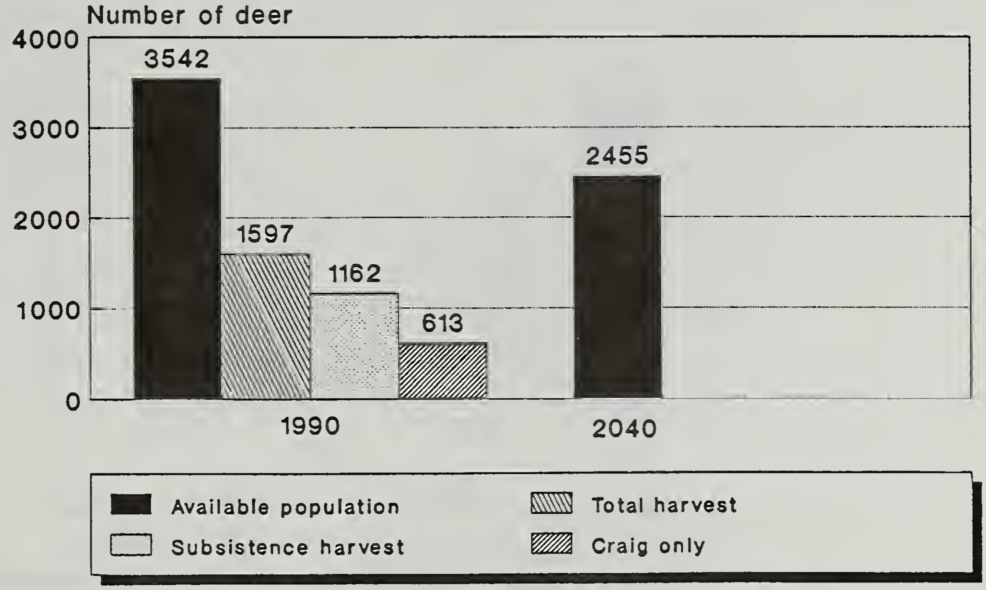
Eighty-one percent of Coffman Cove's deer came from the Project Area WAA's between 1987 and 1990. Figure 3-39 shows that there is an adequate number of deer to meet the current subsistence demand for deer now and through the year 2040 (with implementation of the preferred alternative of the TLMP Draft Revision); however, at some point in the future it may be necessary to restrict the sport harvest of deer and give the rural communities preference. Table 3-80 shows that the action alternatives will harvest between 303 and 1,109 acres of land used by at least 15 percent of the Coffman Cove households. Table 3-79 shows that current habitat capability in WAA 1420 might not be able to sustain the current harvest level, and all action alternatives will further lower the habitat capability for deer. Alternatives 3 and 4 will also reduce the habitat capability in WAA 1421 below the recommended level to sustain the current harvest level. Both WAA 1420 and 1421 are used by Coffman Cove residents.

Based on the amount of the Project Area used by Coffman Cove residents for deer hunting, the habitat capability of WAA's 1420 and 1421, and the fact that at some point in the future it may be necessary to restrict the sporthunting of deer, there is a significant possibility of a significant restriction of the subsistence use of deer by Coffman Cove residents associated with all proposed alternatives, including the no-action alternatives.

Craig

Figure 3-40

Deer Supply and Harvest in All Areas Used by Craig Residents

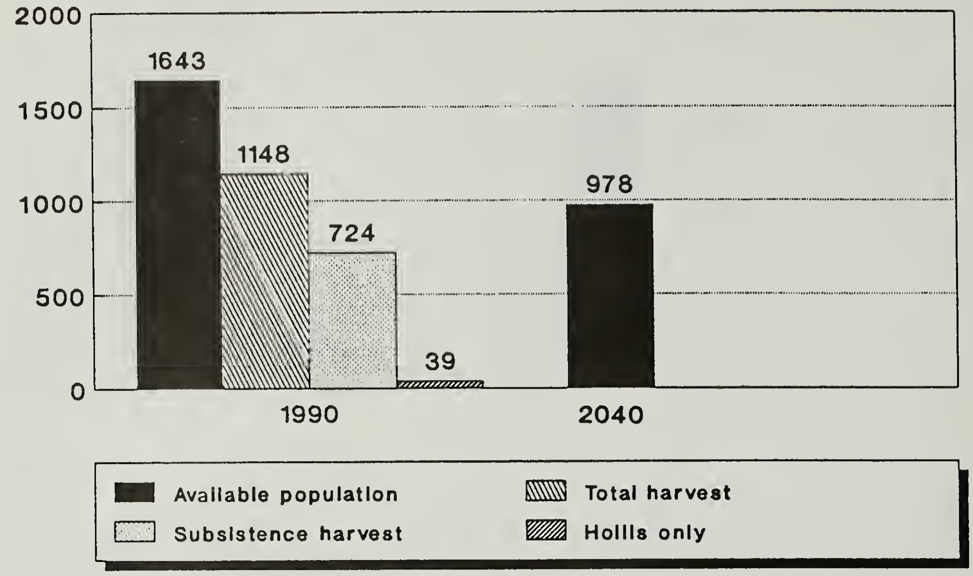


SOURCE: Matson 1992. Based on ADF&G Deer Harvest Data, 1987-90, sorted by WAA and Community, summarized by WAA, ADF&G Division of Subsistence, March 1991.
NOTE: This analysis was conducted only for those WAA's that accounted for 90 percent of the total deer harvest for this community (WAA's 901, 902, 1003, 1316, 1317, 1318, 1319, 1323, 1332, 1421, 1422, 1529, and 1531). Deer Supply was calculated using 10 percent of the estimated deer habitat capability, as recommended by Flynn and Suring (1989).

Twenty-eight percent of Craig's deer came from the Project Area WAA's between 1987 and 1990. Figure 3-40 shows that there is an adequate number of deer to meet the current subsistence and sporthunting demand for deer now and through the year 2040 (with implementation of the preferred alternative of TLMP Draft Revision). Table 3-80 shows that the action alternatives will harvest between 105 and 1,232 acres of land used by at least 15 percent of the Craig households. The habitat capability in WAA 1421 (Table 3-78) may be reduced below the recommended level to sustain current harvest levels by Alternatives 3 and 4. WAA 1421 is used by Craig residents.

Based on the amount of the Project Area used by Craig residents for deer hunting, the habitat capability in WAA 1421, and the fact that at some point in the future it may be necessary to restict the sporthunting of deer, there is a significant possibility of a significant restriction of the subsistence use of deer by Craig residents associated with all proposed alternatives, including the no-action alternatives.

Figure 3-41
Deer Supply and Harvest in All Areas Used by Hollis Residents



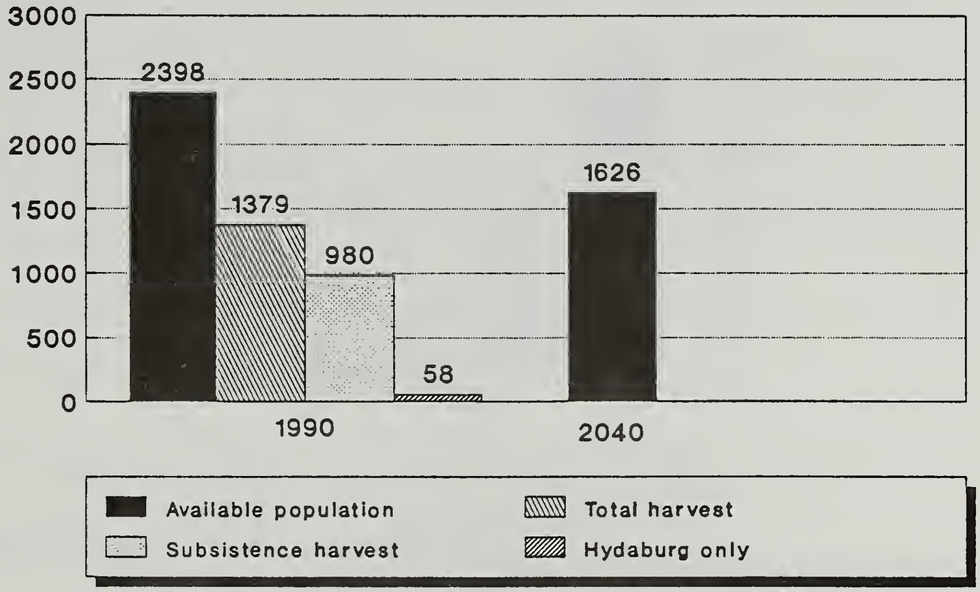
SOURCE: Matson 1992. Based on ADF&G Deer Harvest Data, 1987-90, sorted by WAA and Community, summarized by WAA, ADF&G Division of Subsistence, March 1991.
NOTE: This analysis was conducted only for those WAA's that accounted for 90 percent of the total deer harvest for this community (WAA's 1211, 1315, 1317, 1318, 1420, 1421,and 1422). Deer Supply was calculated using 10 percent of the estimated deer habitat capability, as recommended by Flynn and Suring (1989).

Fifty-one percent of Hollis's deer came from the Project Area WAA's between 1987 and 1990. Figure 3-41 shows that there is an adequate number of deer to meet the current subsistence demand for deer now and through the year 2040, (with implementation of the preferred alternative of TLMP Draft Revision); however, at some point in the future it may be necessary to restrict the sport harvest of deer and give the rural communities preference. Table 3-80 shows that the action alternatives will not harvest any land used by at least 15 percent of the Hollis households. Table 3-79 shows that current habitat capability in WAA 1420 might not be able to sustain the current harvest level, and all action alternatives will further lower the habitat capability for deer. Alternatives 3 and 4 will also reduce the habitat capability in WAA 1421 below the recommended level to sustain the current harvest level. Both WAA 1420 and 1421 are used by Hollis residents.

Based on the amount of the Project Area used by Hollis residents for deer hunting, the habitat capability of WAA's 1420 and 1421, and the fact that at some point in the future it may be necessary to restrict the sporthunting of deer, there is a significant possibility of a significant restriction of the subsistence use of deer by Hollis residents associated with all proposed alternatives, including the no-action alternatives.

Hydaburg

Figure 3-42
Deer Supply and Harvest in all Areas Used by Hydaburg Residents

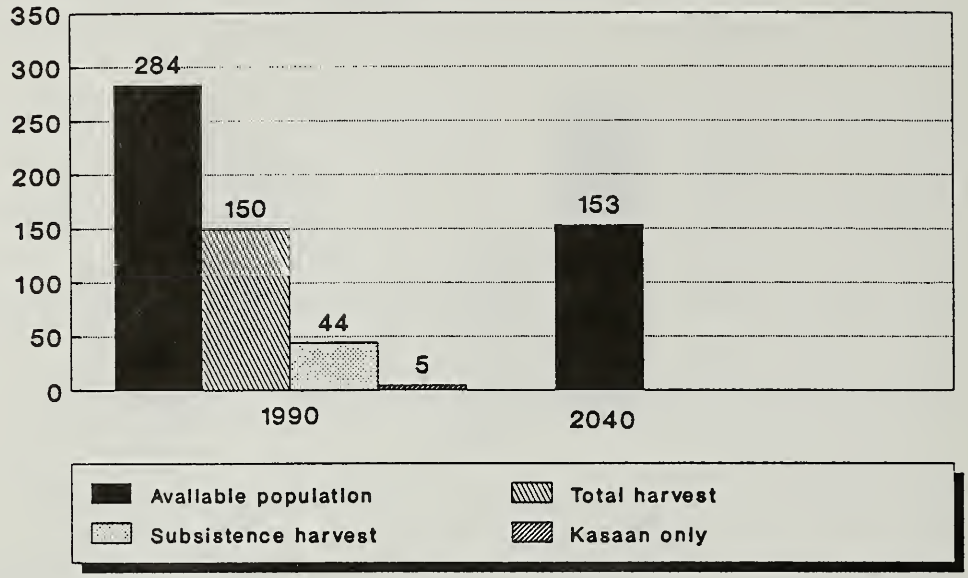


SOURCE: Matson 1992. Based on ADF&G Deer Harvest Data, 1987-90, sorted by WAA and Community, summarized by WAA, ADF&G Division of Subsistence, March 1991.
NOTE: This analysis was conducted only for those WAA's that accounted for 90 percent of the total deer harvest for this community (WAA's 901, 1107, 1316, 1317, 1318, 1319, 1332, 1420, 1421, and 1422). Deer Supply was calculated using 10 percent of the estimated deer habitat capability, as recommended by Flynn and Suring (1989).

Forty percent of Hydaburg's deer came from the Project Area WAA's between 1987 and 1990. Figure 3-42 shows that there is an adequate number of deer to meet the current subsistence and sporthunting demand for deer now and through the year 2040, (with implementation of the preferred alternative of TLMP Draft Revision). Table 3-80 shows that the action alternatives will harvest between 0 and 125 acres of land used by at least 15 percent of the Hydaburg households. The habitat capability in WAA 1420 (Table 3-78) may already be below the level necessary to sustain current harvest levels, and action alternatives will reduce the habitat capability further. The habitat capability in 1421 may be reduced below the recommended level to sustain current harvest levels by Alternatives 3 and 4. WAA's 1420 and 1421 are used by Hydaburg residents.

Based on the amount of the Project Area used by Hydaburg residents for deer hunting, the habitat capability in WAA's 1420 and 1421, and the fact that at some point in the future it may be necessary to restrict the sporthunting of deer, there is a significant possibility of a significant restriction of the subsistence use of deer by Hydaburg residents associated with all proposed alternatives, including the no-action alternatives.

Figure 3-43
Deer Supply and Harvest in all Areas Used by Kasaan Residents



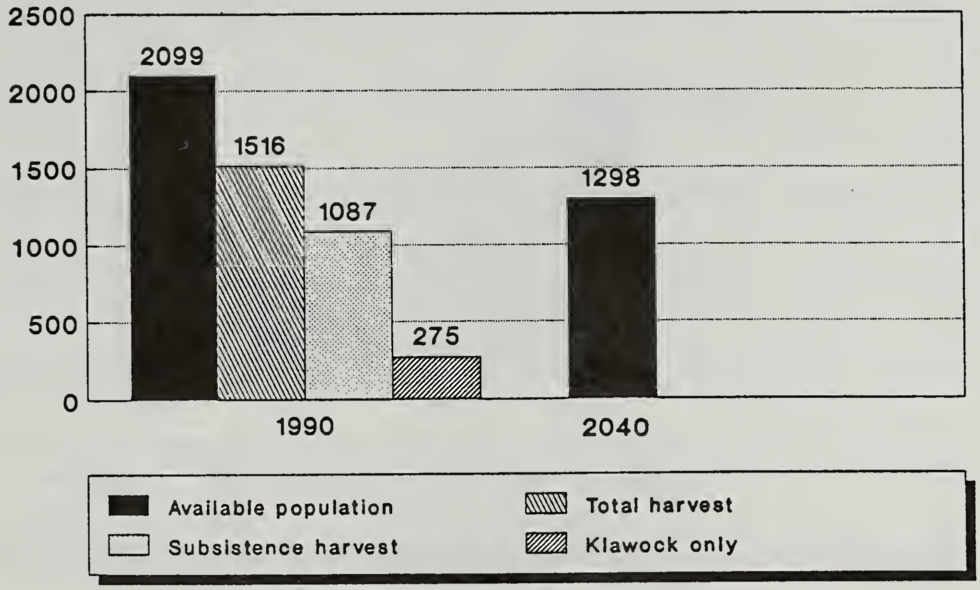
SOURCE: Matson 1992. Based on ADF&G Deer Harvest Data, 1987-90, sorted by WAA and Community, summarized by WAA, ADF&G Division of Subsistence, March 1991.
NOTE: This analysis was conducted only for those WAA's that accounted for 90 percent of the total deer harvest for this community (WAA 1315). Deer Supply was calculated using 10 percent of the estimated deer habitat capability, as recommended by Flynn and Suring (1989).

Sixty percent of Kasaan's deer came from the Project Area WAA's between 1987 and 1990. Figure 3-43 shows that there is an adequate number of deer to meet the current subsistence and sporthunting demand for deer now and through the year 2040, (with implementation of the preferred alternative of TLMP Draft Revision). Table 3-80 shows that the action alternatives will harvest between 0 and 62 acres of land used by at least 15 percent of the Kasaan households. WAA 1315 has habitat capability in excess of demand.

Based on the amount of harvest planned in areas used by Kasaan residents for deer hunting, and the surplus of deer habitat capability in WAA 1315, there is no significant possibility of a significant restriction of the subsistence use of deer by Kasaan residents associated with the proposed action alternatives.

Klawock

Figure 3-44
Deer Supply and Harvest in All Areas Used by Klawock Residents



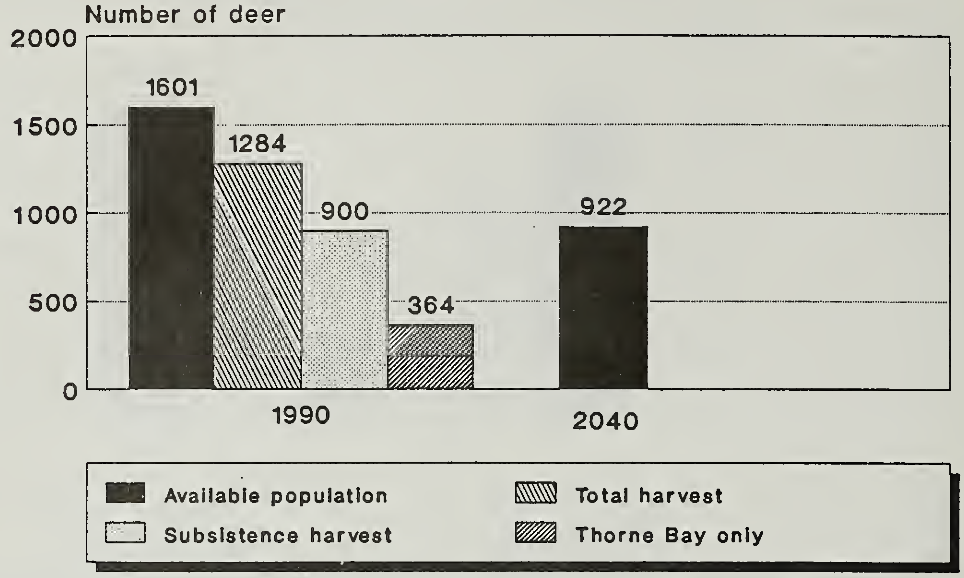
SOURCE: Matson 1992. Based on ADF&G Deer Harvest Data, 1987-90, sorted by WAA and Community, summarized by WAA, ADF&G Division of Subsistence, March 1991.
NOTE: This analysis was conducted only for those WAA's that accounted for 90 percent of the total deer harvest for this community (WAA's 901, 1317, 1318, 1319, 1323, 1420, 1421, 1422 and 1529). Deer Supply was calculated using 10 percent of the estimated deer habitat capability, as recommended by Flynn and Suring (1989).

Thirty-two percent of Klawock's deer came from the Project Area WAA's between 1987 and 1990. Figure 3-44 shows that there is an adequate number of deer to meet the current subsistence demand for deer now and through the year 2040, (with implementation of the preferred alternative of TLMP Draft Revision); however, at some point in the future it may be necessary to restrict the sport harvest of deer and give the rural communities preference. Table 3-80 shows that the action alternatives will harvest between 177 and 1,538 acres of land used by at least 15 percent of the Klawock households. Table 3-78 shows that current habitat capability in WAA 1420 might not be able to sustain the current harvest level and all action alternatives will further lower the habitat capability for deer. Alternatives 3 and 4 will also reduce the habitat capability in WAA 1421 below the recommended level to sustain the current harvest level. Both WAA 1420 and 1421 are used by Klawock residents.

Based on the amount of the Project Area used by Klawock residents for deer hunting, the habitat capability of WAA's 1420 and 1421, and the fact that at some point in the future it may be necessary to restrict the sporthunting of deer, there is a significant possibility of a significant restriction of the subsistence use of deer by Klawock residents associated with all proposed alternatives.

Thorne Bay

Figure 3-45
Deer Supply and Harvest in All Areas Used by Thorne Bay Residents



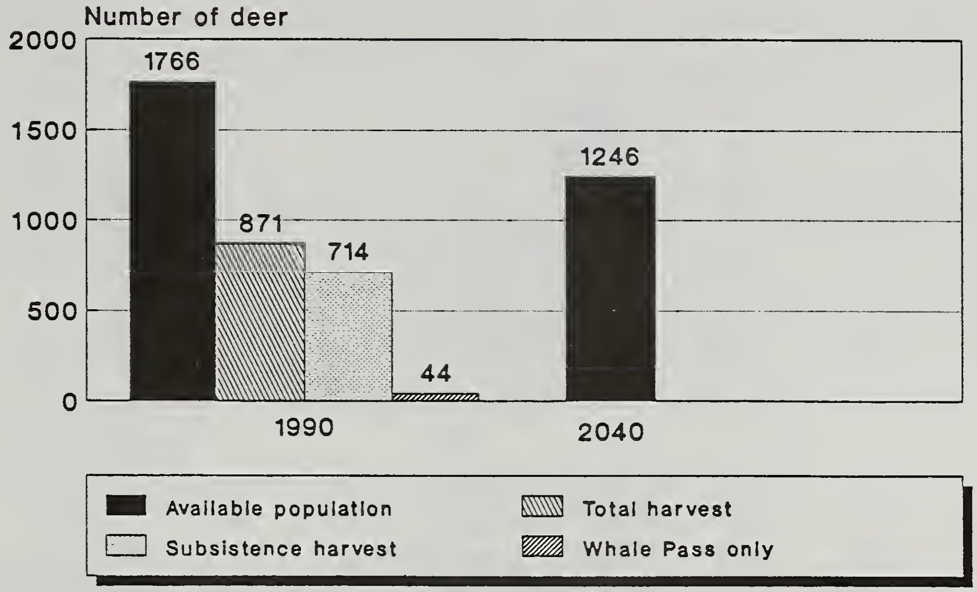
SOURCE: Matson 1992. Based on ADF&G Deer Harvest Data, 1987-90, sorted by WAA and Community, summarized by WAA, ADF&G Division of Subsistence, March 1991.
NOTE: This analysis was conducted only for those WAA's that accounted for 90 percent of the total deer harvest for this community (WAA's 1315, 1318, 1319, 1420, 1421, and 1422). Deer Supply was calculated using 10 percent of the estimated deer habitat capability, as recommended by Flynn and Suring (1989).

Eighty-seven percent of Thorne Bay's deer came from the Project Area WAA's between 1987 and 1990. Figure 3-45 shows that there is an adequate number of deer to meet the current subsistence demand for deer now and through the year 2040 (with implementation of the preferred alternative of TLMP Draft Revision); however, at some point in the future it may be necessary to restrict the sport harvest of deer in order to give rural communities priority. Table 3-80 shows that the action alternatives will harvest between 189 and 1,115 acres of land used by at least 15 percent of the Thorne Bay households. The habitat capability in 1420 (Table 3-78) is already below the recommended level to sustain the current level of harvest. The habitat capability in 1421 may be reduced below the recommended level to sustain current harvest levels by Alternatives 3 and 4. WAA's 1420 and 1421 are used by Thorne Bay residents.

Based on the amount of the Project Area used by Thorne Bay residents for deer hunting, the possible restrictions to sporthunting of deer, and the habitat capability in WAA's 1420 and 1421, there is a significant possibility of a significant restriction of the subsistence use of deer by Thorne Bay residents associated with all proposed alternatives, including the no-action alternatives.

Whale Pass

Figure 3-46
Deer Supply and Harvest in All Areas used by Whale Pass Residents

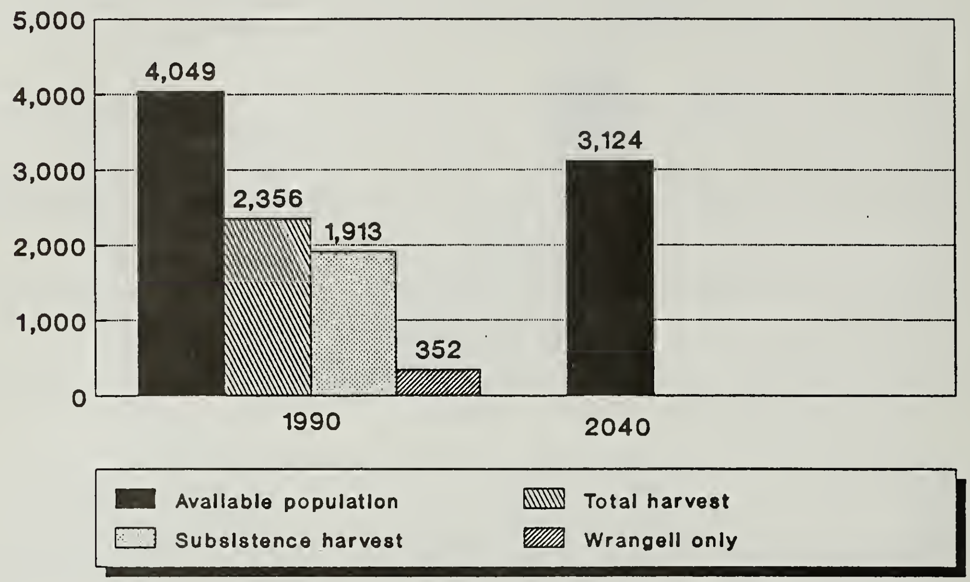


SOURCE: Matson 1992. Based on ADF&G Deer Harvest Data, 1987-90, sorted by WAA and Community, summarized by WAA, ADF&G Division of Subsistence, March 1991.
NOTE: This analysis was conducted only for those WAA's that accounted for 90 percent of the total deer harvest for this community (WAA's 1107, 1318, 1319, 1527, 1529 and 1530). Deer Supply was calculated using 10 percent of the estimated deer habitat capability, as recommended by Flynn and Suring (1989).

Seventy-one percent of Whale Pass's deer came from the Project Area WAA's between 1987 and 1990. Figure 3-46 shows that there is an adequate number of deer to meet the current subsistence and sporthunting demand for deer now and through the year 2040 (with implementation of the preferred alternative of TLMP Draft Revision). Table 3-80 shows that the action alternatives will harvest between 209 and 512 acres of land used by at least 15 percent of the Whale Pass households. The habitat capability in 1319, 1527, and 1530 (Table 3-78) appears to be adequate to sustain current harvest levels through 2040.

Based on the amount of the Project Area used by Whale Pass residents for deer hunting that is proposed for harvest, and the amount of deer habitat capability where Whale Pass residents hunt deer, there is no significant possibility of a significant restriction of the subsistence use of deer by Whale Pass residents associated with the proposed action alternatives.

Figure 3-47
Deer Supply and Harvest in all Areas used by Wrangell Residents



SOURCE: Matson 1992. Based on ADF&G Deer Harvest Data, 1987-90, sorted by WAA and Community, summarized by WAA, ADF&G Division of Subsistence, March 1991.
NOTE: This analysis was conducted only for those WAA's that accounted for 90 percent of the total deer harvest for this community (WAA's 1319, 1420, 1526, 1527, 1528, 1529, 1530, 1901, 1903, 1904, 1905, 1906, 1910, 3001, 3313, 3733, 3734, and 3938). Deer Supply was calculated using 10 percent of the estimated deer habitat capability, as recommended by Flynn and Suring (1989).

Twenty percent of Wrangell's deer came from the Project Area between 1987 and 1990. Figure 3-47 shows that there is adequate deer available to meet 45 current level of harvest for subsistence and nonsubsistence use through the year 2040. Table 3-80 shows that there are 0 acres of land proposed for harvest where more than 15 percent of Wrangell residents harvest deer.

Based on the lack of projected direct effects on Wrangell deer harvesting in the Project Area, there is no significant possibility of a significant restriction of subsistence use of deer by Wrangell residents associated with the proposed action alternatives.

Deer: Summary of Findings for Subsistence Use

One or more of the proposed actions may have a significant possibility of a significant restriction of subsistence use of Sitka black-tailed deer by the residents of Coffman Cove, Craig, Hollis, Hydaburg, Klawock, and Thorne Bay (see Table 3-81).

Table 3-81
Significant Possibility of a Significant Restriction of Subsistence Use of Sitka Black-tailed Deer

	Significant Possibility of Restriction					
Community	Alt.1	Alt.1a	Alt.2	Alt.3	Alt.4	Alt.5
Abundance or Distribution						
Coffman Cove	Yes	Yes	Yes	Yes	Yes	Yes
Craig	Yes	Yes	Yes	Yes	Yes	Yes
Hollis	Yes	Yes	Yes	Yes	Yes	Yes
Hydaburg	Yes	Yes	Yes	Yes	Yes	Yes
Kasaan	No	No	No	No	No	No
Klawock	Yes	Yes	Yes	Yes	Yes	Yes
Petersburg	No	No	No	No	No	No
Point Baker	No	No	No	No	No	No
Port Protection	No	No	No	No	No	No
Thorne Bay	Yes	Yes	Yes	Yes	Yes	Yes
Whale Pass	No	No	No	No	No	No
Wrangell	No	No	No	No	No	No
Access						
All communities	No	No	No	No	No	No
Competition						
All communities	No	No	No	No	No	No

SOURCE: Matson 1992.
Note: "No" indicates an insignificant possibility of a substantial effect. "Yes" indicates a significant possibility of a substantial effect.

Direct, Indirect, and Cumulative Effects on Other Resources

Other Resources: Abundance and Distribution

Furbearers. Furbearers are presently being trapped in the Project Area (Tables 3-74 and 3-75). This evaluation assumes most of the trappers are from the surrounding rural communities.

Past timber harvest in the Project Area reduced marten habitat capability from 691 to 469, which is 30 percent (Table 3-43, in the Wildlife section of this chapter). Marten habitat capability is assumed to reflect potential marten abundance and furbearer abundance. The Wildlife section analysis in this chapter indicates that the proposed timber harvest would potentially reduce marten habitat capability an additional 4.5 percent.

Table 3-74 earlier in this section indicates that the 1990 marten abundance is sufficient to sustain the 1984 to 1990 average harvest of 230 martens. In fact, there is habitat capable of supporting at least 890 martens. With a 4.5 percent reduction of the current habitat capability, there will still be sufficient numbers of martens to sustain the average harvest under any alternative. Roads left open for public use during trapping season may further decrease marten populations. However, overharvest can be mitigated by harvest regulation and road closures.

Past timber harvest in the Project Area reduced otter habitat capability from 192 to 126, which is reduced by 34 percent (Table 3-43, in the Wildlife section). Proposed timber harvest alternatives would potentially reduce otter habitat capability an additional 2 percent or less. The population needed to support current harvest levels is 109 (Table 3-75) and the current habitat capability is 305. A 2 percent decrease in habitat capability would still provide adequate habitat capability to support current harvest levels.

Changes in local furbearer distribution are expected when old-growth forest habitat is harvested and those areas convert to second growth.

Waterfowl. A variety of waterfowl use the freshwater and saltwater habitats in the Project Area. The Vancouver Canada goose was selected as an indicator of potential project effects on waterfowl. Vancouver Canada goose habitat capability is assumed to reflect potential Vancouver Canada goose abundance and waterfowl abundance. In the Wildlife section of this chapter, it is projected that habitat capability for Vancouver Canada goose has decreased 5 percent since 1954 (1,020 to 972, Table 3-43).

Timber harvest unit locations generally avoid important waterfowl areas. The estuary grass flats, beach fringe, and borders of inland lakes and streams would remain largely unaffected. There are no acres of beach fringe or estuary fringe proposed for harvest.

Black Bear. Black bear generally is not utilized as a major food source but is mostly hunted for sport; however, limited use is made of parts of the bear for cultural purposes. About 46 percent of the black bear taken on Prince of Wales Island since 1985/86 have been harvested by nonresident hunters (see Figure 3-23, in the Wildlife section).

In the Wildlife section of this chapter, it is noted that a 14 percent reduction in potential black bear habitat capability (Table 3-43) has resulted from past timber harvest in the Project Area. Black bear habitat capability is assumed to reflect potential black bear abundance. The overall reduction in black bear habitat capability indicates that the potential reduction in black bear abundance from past activities has not been substantial.

The Wildlife section analysis in this chapter indicates that proposed timber harvest in the action alternatives would potentially reduce black bear habitat capability another .6 percent. All action alternatives will reduce current habitat capability by an estimated 3 animals. Roads left open to vehicle access for bear hunting following timber harvest may increase hunting success.

Table 3-43, in the Wildlife section of this chapter, shows that proposed timber harvest in important black bear habitats is generally low. No timber harvest is proposed within beach and estuary fringe habitats. Road construction in streamside riparian habitat is less than one percent.

Changes in local black bear distribution will occur in the vicinity of ongoing activities during the life of the proposed project, as black bears tend to avoid contact with people. The bears tend to move back into these areas after timber harvest is completed. Foreseeable changes in local black bear distribution are expected when the age of the second growth on harvest units reaches about 25 years.

With a 0.6 percent decrease in black bear habitat capability, black bear abundance under all alternatives will be sufficient to sustain the 1986 to 1991 average subsistence harvest (Table 3-73, earlier in this section) in Project Area WAA's. Currently the black bear harvest in WAA's 1315, 1420, and 1527 is greater than the estimated habitat capability, indicating possible overharvest and potential future displacement of hunters. However, due to the fact that 46 percent of bear harvest is by nonresidents and an unknown number of nonrural residents (Figure 3-23 in the Wildlife section), the harvest can be regulated by the Federal Subsistence Board to ensure provision of subsistence needs.

Marine Mammals. Federal law prohibits the taking of marine mammals by anyone other than Native hunters. There is no evidence that timber harvest activities have had any effects on marine mammals taken for subsistence, or that harvest activities have any effect on marine mammal habitat.

Salmon. Salmon are a major subsistence food harvested in the CPOW Project Area. Several concerns about potential effects on the fisheries resource surfaced in public comments during scoping. Areas of specific concern were Staney Creek, Logjam Creek, Hatchery Creek, Thorne River, Sarkar Lakes, and Sweetwater Lake.

The Fisheries section of this chapter concludes that potential effects of the proposed timber harvest and road construction alternatives on salmon spawning and rearing habitat would be minimal or eliminated by applying the Forest Service standards, guidelines, and prescriptions described in detail in the Aquatic Habitat Management Handbook (FSH 2609.24) and Soil and Water Conservation Handbook (FSH 2509.22). All salmon spawning and rearing streams (Class I and Class II streams) near proposed timber harvest units are protected by buffers of at least 100 feet as prescribed in the TTRA. In addition, specific prescriptions for protecting salmon habitat were incorporated during the design of harvest and roads.

Based on the implementation of site-specific prescriptions developed during interdisciplinary meetings for protecting salmon spawning and rearing habitat, the Draft EIS projects that the immediate and foreseeable effects on the abundance and distribution of salmon for subsistence uses in the Project Area would not be measurable.

Other Finfish. The action alternatives for the proposed project would have no immediate or foreseeable effect on other finfish habitat. Because there would be no effect on other finfish habitat, the abundance and distribution of those other finfish would not be affected.

Shellfish. Based on the limited impact the existing LTF sites have on marine and estuarine habitat, crabs, and benthic organisms, the effect of this project on the abundance and distribution of local crabs, clams, and other shellfish would not be measurable for purposes of subsistence. The project would not have any additional impacts on shellfish for the foreseeable future.

Other Food Resources. Other foods include plants such as kelp, goose tongue, a variety of berries, etc. Most traditional other food gathering occurs near beach and estuarine areas. Timber harvest units and roads proposed in action alternatives 2 through 5 in the Project Area may infringe upon beach areas potentially used for other food gathering if gathering extends beyond 500 feet of the beach (there are no proposed harvest units within 500 feet of the beach). Road construction activities would improve access to berry picking sites that are now not reasonably accessible.

Since beach fringe and estuaries will not be significantly affected by the proposed timber harvest, and since additional food gathering sites will be made available, the project's activities and foreseeable impacts are not expected to substantially affect the abundance and distribution of other foods.

Firewood/Personal Use Wood. The Forest Service has a free-use policy (with limits) for firewood and timber and none of the proposed alternatives will have an adverse effect on the availability of firewood, personal-use timber, and traditional uses of wood, such as for totem poles.

Other Resources: Access

Access to traditional subsistence-use areas may be affected where logging activities are located in the beach fringe. This is because traditional subsistence access is by boat to the beaches of the Project Area (Ellanna and Sherrod 1986). The effect on access would probably be minor under all alternatives because no beach fringe will be harvested in the Project Area and no marine and estuarine habitat will be affected by logging activities.

New and rebuilt roads will provide access to areas that were not previously used for subsistence harvesting resources. (See Alternative maps, separate map packet, for details.) Miles of road proposed for construction are shown in Figure 2-6 in Chapter 2). Road access would favor harvest by residents who live in communities connected to the road system or who bring a vehicle to POW Island on the ferry.

Road closures and other management prescriptions developed for Project Area roads will take subsistence uses into consideration. For the purposes of this EIS, the Access Management Plan will be the same as that specified in Option B in the 1989-94 LTS EIS.

Other Resources: Competition

Competition for subsistence resources in the CPOW Project Area is an issue to residents of Prince of Wales Island. Residents are concerned with competition from residents of Ketchikan, mostly because of the numbers of people that come to the Island via the ferry. Since Ketchikan residents are considered nonrural, this competition can be regulated if it starts to restrict nonrural residents' ability to obtain subsistence resources.

There is no evidence to indicate that availability of salmon, finfish, shellfish or other food resources to subsistence users would be affected by sport or nonrural harvest. Any increase in competition from nonrural residents and Alaska nonresidents would not be substantial because of the availability of resources in the immediate vicinity and in the surrounding areas.

Individual household use of specific areas may be displaced by some of the proposed actions. There is not sufficient information available nor would it be practical to evaluate displacement potential for individual households. The Project Area's accessibility makes it very unlikely that an individual household or even an entire community is highly dependent on specific areas within the Project Area that may be affected by proposed actions. Generally, there are sufficient lands available elsewhere within or outside the Project Area for subsistence gathering. The known uses of the Project Area by individual communities is discussed earlier in this section.

Other Resources: Cumulative Effects

This EIS evaluates the cumulative effects on subsistence practices in the Project Area and other Forest Service lands associated with continued implementation of the TLMP. The evaluation of cumulative effects for subsistence resources determines whether or not future activities may restrict subsistence uses and identifies the rural communities using the Project Area that would be most affected by a restriction.

Based on projected future timber harvest, a total of approximately 10,000 acres will be harvested in the Project Area by 2004 (see Appendix A). The Wildlife section projects that this level of harvest would affect the habitat capability of several wildlife species. The changes in habitat capability could affect their abundance and distribution. Relative to habitat capability estimated for 1954, the potential deer habitat capability by the year 2040 is projected to decrease cumulatively by 43 percent; the potential marten habitat capability is projected to decrease cumulatively by 43 percent; the potential black bear habitat capability is projected to decrease cumulatively by 15 percent; the potential otter habitat capability is projected to decrease cumulatively by 35 percent; the potential Vancouver Canada goose habitat capability is projected to decrease cumulatively by 10 percent (Table 3-56, in the Wildlife section of this chapter).

These potential decreases in abundance could increase competition for the species important for subsistence. However, the abundance of black bear, marten, otter, and Vancouver Canada goose appears to be sufficient to meet subsistence needs in the Project Area through 2040. Fish, shellfish, and other food resources should likewise be available to meet subsistence needs. The total habitat capability from all Project Area WAA's is sufficient to meet the current demand from all subsistence communities that harvest deer from the Project Area. Future reductions in habitat capability and corresponding deer populations resulting from timber harvest will exacerbate the potential conflict between subsistence harvest and non-subsistence harvest of deer in the Project Area. In addition, to be successful hunters may need to make changes from their past hunting techniques or location or time of hunt. These possibilities reinforce the conclusion that the subsistence use of deer in the Project Area may be significantly restricted.

Actions on other lands surrounding the Project Area could also affect the abundance or distribution, access to, and competition for the subsistence resources harvested by the rural communities using the Project Area. Appendix A displays the other Forest Service timber sale projects in progress or being planned in the vicinity of the CPOW Project. Enough is known about foreseeable activities on other lands surrounding the Project Area to project that subsistence use of deer may be significantly restricted in the future. Subsistence use of salmon, other finfish, shellfish or other resources in the Project Area is not expected to be significantly restricted.

Much of the private lands adjacent to the Project Area are owned by native corporations, and much of the lands have had the timber harvested. The analysis for all wildlife species (habitat capability models) assumed a worst case scenario, and did not calculate any habitat capability on private lands.

Other Resources: Findings

The above analysis leads to the conclusion that the actions proposed in Alternatives 2 through 5 do not present a significant possibility of a significant restriction on subsistence use of black bear, furbearers, waterfowl, marine mammals, salmon, other finfish, shellfish, or other food resources in the Project Area (Tables 3-82 and 3-83). This finding is based on the potential resource effects by the three evaluation categories: abundance and distribution, access, and competition.

Table 3-82
Significant Possibility of a Significant Restriction of Subsistence Use of Fish Resources

	Alt.1	Alt.1a	Alt.2	Alt3	Alt.4	Alt.5
Abundance or Distribution	No	No	No	No	No	No
Access	No	No	No	No	No	No
Competition	No	No	No	No	No	No

SOURCE: Matson 1992.
Note: "No" indicates an insignificant possibility of a substantial effect. "Yes indicates a significant possibility of a substantial effect.

Table 3-83
Significant Possibility of a Significant Restriction of Subsistence Use of Other Resources

	Alt.1	Alt.1a	Alt.2	Alt.3	Alt.4	Alt.5
Abundance or Distribution	No	No	No	No	No	No
Access	No	No	No	No	No	No
Competition	No	No	No	No	No	No

SOURCE: Matson 1992.
Note: "No" indicates an insignificant possibility of a substantial effect. "Yes " indicates a significant possibility of a substantial effect.

Other Conclusions

Section 810 (a) (3) of ANILCA requires that when a significant restriction may occur, determinations must be made in regard to whether:

> Such a significant restriction of subsistence uses is necessary and consistent with sound management principles for the utilization of public lands;

The proposed activity will involve the minimum amount of public lands necessary to accomplish the purposes of such use and occupancy, or other disposition;

Reasonable steps will be taken to minimize adverse impacts upon subsistence uses and resources resulting from such actions.

The following section outlines the other conclusions of this EIS.

Necessary and Consistent with Sound Management of Public Lands

The alternatives proposed in the Central Prince of Wales Draft EIS have been examined to determine whether they are necessary and consistent with sound management of public lands. In this regard the National Forest Management Act of 1976, the ANILCA, the Alaska Regional Guide, the TLMP, the TLMP 1985-86 Amendment, 1991 TLMP Revision Draft EIS, the Alaska State Forest Practices Act, and the Alaska Coastal Zone Management Program have been considered.

The ANILCA placed an emphasis on the maintenance of subsistence resources and lifestyles. However, the Act also required the Forest Service to make available for harvest 4.5 billion board feet of timber per decade from the Tongass National Forest and left the KPC contract in place. The TTRA removed the 4.5 MMBF requirement from ANILCA but directed the Forest Service to seek to meet market demand and the market demand for the planning cycle, and left the volume requirements and contract area of the KPC contract in place.

The Alternatives presented here encompass four different approaches that would produce the resources that would best meet the purpose and need of this EIS. All of the alternatives involve some potential to affect subsistence uses. There is no alternative, including the no-action alternative, that will avoid a significant possibility of subsistence restrictions somewhere in the Forest. Therefore, based on the analysis of the information presented in this document on the proposed alternatives, these actions are necessary and consistent with the sound management of public lands.

Amount of Public Land Necessary to Accomplish the Purpose of the Proposed Action

Appendix A addresses the availability of other lands within the KPC contract area suitable for the timber harvest. Much of the Tongass National Forest is used by one or more rural communities for subsistence purposes for deer hunting. The areas of most subsistence use are the areas adjacent to existing road systems, the beaches, and the areas in close proximity to communities. Within the Project Area, the extent and location of the subsistence use area precludes complete avoidance. Areas other than subsistence use areas that could be harvested may be limited by other resource concerns such as: soil and water protection; high value wildlife habitat; economics; visuals; or unit and road design. Effort was taken to protect the highest value subsistence areas. For example, beach fringe is one of the highest use subsistence areas and none will be harvested under any of the proposed alternatives.

The impact of viable timber harvest projects always includes alteration of old-growth habitat, which in turn always reduces projected habitat capability for old-growth-associated subsistence species. It is not possible to lessen harvest in one area and concentrate it in another without affecting one or more rural communities' important subsistence use areas.

Reasonable Steps to Minimize Adverse Impacts Upon Subsistence Uses and Resources

Reasonable steps to minimize impacts on subsistence have been incorporated in development of the alternatives and project design criteria. Project design criteria called for locating roads and units outside of important subsistence use areas such as the beach fringe, estuary fringe, and riparian areas adjacent to salmon streams. During development of alternatives, an effort was made to minimize activities that could adversely affect important subsistence use areas.

Draft EIS Conclusions

The Record of Decision (ROD) for the Final EIS for the CPOW Project will include a final determination about the significant restriction on subsistence used that may result from implementation of the selected alternative. Below is a summary of the Draft EIS evaluation and findings.

1) The potential foreseeable effects from the action alternatives in the CPOW project do not present a significant possibility of a significant restriction of subsistence uses of black bear, furbearers, marine mammals, waterfowl, salmon, other finfish, shellfish, and other foods.

2) There is a significant possibility of a significant restriction of subsistence use of deer in the Project Area for Coffman Cove, Craig, Hollis, Hydaburg, Kasaan, Klawock, and Thorne Bay residents regardless of which alternative is implemented, including the no-action alternatives.

3) At some point in the future it may be necessary to restrict the sport harvest of deer and give subsistence users priority.

Hearings

On the basis of findings of this analysis and under the provisions of the Alaska National Interest Lands Conservation Act, subsistence hearings will be held on the dates, times, and at the places announced in the letter accompanying the Draft EIS. Letters are being sent to the Federal Subsistence Board, Alaska Department of Fish and Game, Regional Fish and Game Advisory Councils, Local Fish and Game Advisory Committees, and to the Post Offices in Coffman Cove, Craig, Hydaburg, Klawock, Ketchikan, and Thorne Bay where hearings will be held. Announcements will be made in newspapers and on the radio. Testimony at the hearings can be either verbal or written. People unable to attend are encouraged to have another person submit their written testimony at the hearing. If preferred, people can send written testimony to the CPOW Planning Team if postmarked on or before the date of the hearing in the community which the testimony is for. Testimony received, both verbal and written, will be incorporated into this Draft EIS, as determined to be necessary by the Forest Service, to produce the Final EIS.

SOCIO-ECONOMIC ENVIRONMENT

Key Terms

Cant - a log partially or wholly cut and destined for further processing
Discounted Benefits - the sum of all benefits derived from the Forest over the life of a project
Discounted Costs - the sum of all costs incurred from the Project Area during its period of implementation
Present Net Value - the difference between benefits and costs associated with the alternatives

Introduction

The affected environment and environmental consequences portions of the economic and social environment will be discussed together for each sub-section. The sub-sections are: Communities and Lifestyles, Employment and Income, Net Cash Flow and Payments to State, Economic Efficiency, and Timber Demand Analysis.

The economies of most communities affected by the Central Prince of Wales (CPOW) project depend almost exclusively on the Tongass National Forest to provide natural resources for uses such as fishing, hunting, tourism, recreation, timber harvesting, mining and subsistence uses. There is very little private land to provide these resources. Consequently, maintaining the abundant natural resources found in the CPOW Project Area concern those who make their living here.

Historical Social and Economic Trends

The society affected by the CPOW project is influenced by a variety of cultures, from its earliest peoples to its most recent inhabitants. The abundant resources of the forest and waters have provided food, shelter, and livelihood to its inhabitants for thousands of years. The first inhabitants of the area, the Tlingit and Haida, adapted well to the coastal environment, and were able to subsist on the area's natural resources, developing rich cultures. The numerous waterways allowed for mobility, which aided in expanding trade and gathering food.

In the 1700's, the Russians began exploration in Alaska. The fur trade, primarily sea otter pelts, was the main force driving European colonization. When most of the sea otter populations were depleted, the fur industry declined, and Russia lost interest in her North American colony. Alaska was then sold to the U.S. in 1867.

As colonization continued with U.S. occupation, new industries developed. In the late 1800's commercial fish canning became an important part of the economy of area influenced by the CPOW project. During that same period, the discovery of gold brought thousands of miners to the area, many of whom were then followed by their families. In the 1920's and 1930's, the Depression brought a decline in fish prices and mining employment.

Timber resources were used by the earliest inhabitants for shelter, heat, utility, and cultural purposes. The Russians also harvested timber for building ships and structures, but commercial timber harvest did not develop until the 1900's. In the earlier part of the century, small timber mills were operated in a few communities, but it was not until the mid twentieth century, that the timber industry became a major social and economic factor in the area affected by the CPOW project, with the development of a large-scale pulp mills in Ketchikan.

Statehood resulted in an economic shift towards more government employment, and an expanding timber industry had implications beyond changes in population levels and distribution. It was a shift towards a diversified economy, with less dependence on extractive and nonrenewable resources, and away from a seasonal economy.

Today, most of the population in the area affected by the CPOW project is concentrated in the urban community of Ketchikan (13,828). The same industries which dominated the area's history—fishing, mining, and timber production—are still prominent industries in Ketchikan. In addition, tourism, which has increased in its economic importance over the past several years, provides a major source of income to the economies of all communities. Government, transportation, and education are also significant sources of income. There are numerous small, rural communities as well, which depend primarily on fishing, timber production, and subsistence for their livelihoods.

Communities and Lifestyles: Affected Environment

The following communities were determined to be those primarily affected by the CPOW project: Coffman Cove, Craig, Hollis, Hydaburg, Kasaan, Klawock, Ketchikan, Port Protection, Point Baker, Saxman, Thorne Bay, and Whale Pass. Each of these communities will first be briefly described in terms of its history, population, economic base, and other lifestyle influences. The estimated consequences of each of the CPOW alternatives will then be described for each community.

Coffman Cove

Coffman Cove was originally established about 1965 as a logging camp by Ketchikan Pulp Company. The State of Alaska selected lands around Coffman Cove in 1981 and has begun disposing of the acreage. The 1990 Census data has 186 people residing in the community. Coffman Cove is directly dependent on the timber industry, although a small amount of commercial fishing and aquaculture occurs.

Craig

Craig is the the largest POW community, with a population of 1,260. The community originally was a Native settlement. However, beginning with a cannery constructed in 1907, the population began to change, and today it is only about 25 percent Native. The current economy is based on commercial fishing and logging.

Hollis

Hollis was first established in the early 1900's with the discovery of gold. There were four mines in the immediate area and several others nearby. Hollis was the location of

the first timber harvest under the Ketchikan Pulp Company Long-Term Sale Contract and was the main source of timber for the pulp mill from 1954 to 1962.

The present community was established in 1981 after a State land sale. The current population is 111 people. Many of the residents have full-time jobs in adjacent communities such as Craig and Klawock. Since the community was established, there has been a steady flow of construction work associated with with roadbuilding and ferry terminal reconstruction. The ferry terminal at Clark Bay is the only ferry terminal on Prince of Wales Island for the Alaska Marine Highway system.

Hydaburg

Hydaburg is a Native village established by the Haidas in 1911 and incorporated as a city in 1915. The 1990 Census has 384 people residing in the community. The Hydaburg economy is based on timber and fishing. Subsistence use also plays a major role in the community.

Kasaan

Kasaan is a village of 54 people located on the western side of Kasaan Penninsula. The community was established on the current location in 1898. Kasaan's economy is based on fishing and timber harvest. Because the economy of the community is currently depressed, subsistence plays a major role in the maintenance of existing lifestyles.

Ketchikan

Ketchikan is located in southern Southeast Alaska, on the southwest side of Revillagigedo Island on Tongass Narrows opposite Gravina Island. Ketchikan is approximately 40 miles, by water, from the Project Area. Ketchikan's 1990 borough population was reported as 13,828.

The Ketchikan area was a summer fishing camp for the Tlingit Indians. Development began with a saltery at the mouth of Ketchikan Creek. Ketchikan was a boom town in the late 1800's. Since the early 1900's, timber products have been an important economic influence in Ketchikan. In 1954, a world-scale pulp mill was built in Ward Cove. Due to its location as transportation center, fishing center, and focus for the region's timber industry, Ketchikan grew rapidly in the 1950's. Recently, tourism has grown in economic importance, along with government, and services.

Klawock

Klawock is a Native community incorporated in 1929. It has a population of about 722, with an economy based on timber harvesting and fishing. The community became a first-class city in 1973.

Metlakatla

Metlakatla is on the south point of Annette Island. The 1990 census reported there were 1,407 people living in the community of which 1,175 or 84 percent were Native. This unique community was established in 1887 when a band of Tsimshian Natives migrated from Northern British Columbia. In 1891 Congress designated Annette Island an Indian reservation, the first in Alaska. The economy of Metlakatla is based on sawmill operations of the Louisiana Pacific Annette Hemlock Mill, Annette Island

Packing Company (a community owned cannery), Tamgass Creek Hatchery, and Metlakatla Indian Community Services.

Port Protection/Point Baker

Port Protection and Point Baker are located on the northern tip of Prince of Wales Island. About 2.2 miles of water separates the two communities, but they are tied together by a common store, Fish and Game Advisory Committee, and similar economies and lifestyles. The community of Point Baker was founded approximately 50 years ago, and Port Protection was founded at least 30 years ago. The presence of safe anchorages for commercial fishing boats attracted settlers. In the 1930's, the Forest Service opened some areas, then part of the Tongass National Forest, for homesites. In 1950, residents petitioned for homesites along the shore of Port Protection. In 1955, the townsite of Point Baker was removed from the Tongass National Forest and in 1977, the State of Alaska selected the Port Protection area.

The 1990 Census data shows the population of Point Baker as 39 people and the population of Port Protection as 62 people.

The Port Protection/Point Baker economy is seasonal in nature, peaking in the summer/fall fishing season. As with other small communities, employment opportunities outside the fishing industry are limited and the residents of the two communities depend on renewable resources.

Saxman

Saxman is located on west Revillagigedo Island on the Tongass Highway, south of Ketchikan. Its population is 266, with 80 percent being Alaska Natives.

Tlingit Indians from the villages of Cape Fox and Tongass chose Saxman as a permanent settlement for a school in 1894, and the community consequently developed there. Fishing and milling timber for themselves and the growing community of Ketchikan were its economic mainstays.

In 1939-40, artifacts and totem poles were retrieved from the original Cape Fox and Tongass village sites and placed in a totem park in Saxman. This park is now a major cultural and tourist attraction.

Being near Ketchikan, Saxman did not develop an independent economy until recently. Although Saxman residents still depend on Ketchikan for most services and employment opportunities, development of a barge terminal, and the Cape Fox Village Corporation investments, have led to some recent growth in Saxman's population and economic base.

The major economic sector of Saxman is local government, followed by social and health services, retail trade, and fisheries. Saxman's economy is seasonal in all sectors except government.

Thorne Bay

Thorne Bay, on the east side of Prince of Wales Island, is a community of about 569 people. It was a logging camp until August 1982, at which time it was incorporated as a second-class municipality. Hunting, fishing and other subsistence activities have always been used to supplement food sources.

Currently, the economy is based on logging, commercial fishing, and charter boat operations. Fishing activities center around Thorne River, which has large runs of salmon and trout. Crabbing, clamming, and shrimping are popular activities in the waters adjacent to the community.

Whale Pass

Whale Pass is a communitiy of approximately 75, which was originally established by Ketchikan Pulp Company as a logging camp about 1962. Lands in the Whale Pass area were originally selected by the State of Alaska in 1977. Currently, the economy is based on commercial fishing, aquaculture, and traditional subsistence activities.

Communities and Lifestyles: Effects of the Alternatives

Table 3-84 displays the short-term social consequences expected to be felt in each of the communities described above. It depicts whether the alternative will have a high, moderate, or low support of the community's lifestyle. It also shows whether the alternative will have a high, moderate, or low coincidence with the community's attitudes, beliefs, and values. Finally, the table indicates if there would be an extreme, slight, or no disruption of community stability and cohesion. Factors considered in this analysis included: dependence on logging, sawmill employment, road access, subsistence use of the area, and recreation use of the area. Public perceptions in the communities regarding resource management were also factored into the analysis.

Thorne Bay, Prince of Wales Island, is one of the communities evaluated for effects of CPOW alternatives.

Table 3-84
Community Lifestyle Changes (Short-term)

	Alternative	Support of Lifestyles	Support of Attitudes/Beliefs/Values	Disruption of Community Stability
Coffman Cove	1 and 1a	Low	Low	Extreme
	2	High	High	No
	3	High	High	No
	4	High	High	No
	5	High	High	No
Craig	1 and 1a	High	High	Slight
	2	Moderate	Moderate	No
	3	Moderate	Moderate	No
	4	Moderate	Moderate	No
	5	Moderate	Moderate	No
Hollis	1 and 1a	High	High	No
	2	Low	Low	No
	3	Low	Low	No
	4	Low	Low	No
	5	Low	Low	No
Hydaburg	1 and 1a	Low	Low	Slight
	2	Moderate	High	No
	3	High	High	No
	4	Moderate	High	No
	5	Moderate	High	No
Kasaan	1 and 1a	Moderate	Moderate	Slight
	2	Low	Low	No
	3	Moderate	Moderate	No
	4	Low	Low	No
	5	Low	Low	No
Ketchikan	1 and 1a	Low	Low	Extreme
	2	High	High	No
	3	High	High	No
	4	High	High	No
	5	High	High	No
Klawock	1 and 1a	High	High	Slight
	2	Moderate	Moderate	Slight
	3	High	High	Slight
	4	Moderate	Moderate	Slight
	5	Moderate	Moderate	Slight
Port Protection	1 and 1a	High	High	Slight
	2	Low	Low	Slight
	3	Low	Low	Slight
	4	Low	Low	Slight
	5	Low	Low	Slight
Point Baker	1 and 1a	High	High	Slight
	2	Low	Low	Slight
	3	Low	Low	Slight
	4	Low	Low	Slight
	5	Low	Low	Slight
Saxman	1 and 1a	High	High	Slight
	2	Moderate	Moderate	No
	3	High	High	No
	4	Moderate	Moderate	No
	5	Moderate	Moderate	No
Thorne Bay	1 and 1a	Low	Low	Extreme
	2	High	High	No
	3	High	High	No
	4	High	High	No
	5	High	High	No
Whale Pass	1 and 1a	Low	Low	Extreme
	2	High	High	Slight
	3	High	High	Slight
	4	High	High	Slight
	5	High	High	Slight

Employment and Income: Affected Environment

Southeast Alaska's economy is characterized by its dependence on four major industries: lumber and paper products, commercial fishing, subsistence, and tourism.

Timber Industry

The forest product mix from the area affected by the CPOW project includes dissolving pulp, logs, cants, dimension lumber, and woodchips. The industry's structure has changed significantly over the past ten years. In 1980, the industry was focused on processing timber from the Tongass National Forest into cants and dissolving pulp; the sawmills processed primarily large-diameter spruce logs, which were sawn just enough to meet the minimum federal standards for export. The smaller or defective spruce logs and most of the hemlock logs were chipped for pulping.

Today, the forest products industry affected by the CPOW project processes a wide spectrum of spruce and hemlock diameter logs into finished lumber products. The wood wastes from the sawing process are chipped for sale. In addition, a new market in Asia developed in the early 1980's for logs from lands conveyed to Alaska Native Corporations through the Alaska Native Claims Settlement Act (P.L. 92-203). Unfortunately, this structural change was painful to employees and costly to local industry. Between 1981 and 1985, total employment in the lumber and pulp mills dropped 29 percent and a number of the older and more inefficient sawmills were abandoned. However, after this structural change, the industry rebounded as market conditions improved and increased direct employment to 3,543 jobs in 1991, up 82 percent from the low in 1985 (see Table 3-85). During this time period, Ketchikan Pulp Corporations contribution to the total employment ranged from 22 to 35 percent of the total.

Because most of Alaska's forest products are exported, fluctuations in timber markets are primarily a function of the international marketplace and do not reflect activities of the region. In spite of these challenges, in 1990 the timber industry provided almost 20 percent more total employment than it did in 1980.

A constant supply of Tongass timber is not the only factor controlling timber employment. Other controlling factors include exchange rates, the overall Pacific Rim demand for wood fiber, and competition among timber suppliers outside the Tongass National Forest. The historical timber industry employment in Southeast Alaska is shown in Table 3-85.

Table 3-85
Timber Industry Employment In Southeast Alaska

Year	Total Southeast Direct Employ. (Jobs)	Total Southeast Timber Employ (Jobs)	Contribution to total Employ. by KPC Harvest of Nat'l. For. Timber (Jobs)	(%)
1980	2,949	5,249	1,785	34
1981	2,733	4,858	1,065	22
1982	2,506	4,456	1,032	23
1983	2,293	4,093	1,020	25
1984	2,041	3,641	1,271	35
1985	1,947	3,447	1,219	35
1986	2,342	4,167	1,107	27
1987	2,790	4,740	1,376	29
1988	3,341	5,691	1,536	27
1989	3,516	6,066	1,775	29
1990	3,543	6,113	1,697	28

Source: Alaska Department of Labor, USDA Forest Service IPASS Analysis.

Commercial Fishing

Although the commercial fisheries industry in Southeast Alaska continues to fluctuate, it remains a major component of the economy. Salmon stocks have recovered from their low levels in the early 1970's. Salmon continues to dominate the industry, both in volume and value of catch, and in harvest-related employment. The labor force and employment associated with fishing is highly seasonal. Table 3-86 shows that fish harvest employment remained relatively stable between 1980 and 1988, largely because Alaska's commercial fisheries have become increasingly regulated. A permit system for salmon regulates the number of harvesters with access to the fishery; halibut harvest is regulated through limited openings and permits. Seafood processing, also a vital component of Southeast Alaska's economy, has undergone changes since 1980. Of major significance were an increased use of floating fish processing facilities, and a trend toward frozen rather than canned salmon.

Table 3-86
Fish Harvesting and Employment In Southeast Alaska

Year	Salmon Harvest (1,000 pounds)	Direct Employment (Jobs)	Total Employment (Jobs)
1980	93,027	3,475	4,700
1981	110,718	3,142	4,267
1982	122,991	3,332	4,507
1983	155,676	3,078	4,178
1984	154,846	3,277	4,452
1985	231,024	3,450	4,675
1986	214,997	3,500	4,750
1987	73,532	3,600	4,875
1988	90,696	3,500	4,725

Source: Alaska Commercial Fisheries Entry Commission, Alaska Department of Labor, Research and Analysis Section, USDA Forest Service IPASS analysis March 1990.

Subsistence

Subsistence hunting, fishing, trapping, and gathering activities represent a major focus of life for many local residents affected by the CPOW project. Some individuals participate in subsistence activities to supplement personal income and provide needed food. Historically the communities affected by the CPOW project have been economically tied to resource-related industries such as commercial fishing, timber harvesting, and recently, tourism. Employment in these industries is seasonal. Salmon return to spawn in the late spring, summer, and early fall. Snow and darkness prohibit much work in timber harvesting during winter months. The tourism season coincides with the summer months.

Within this context of seasonal employment, subsistence harvest of fish and wildlife resources takes on special importance. The use of these resources may play a major role in supplementing cash incomes during periods when the opportunity to participate in the wage economy is either marginal or non-existent. Due to high prices of commercial products provided through the retail sector of the cash economy, the economic role of locally available fish and game takes on added importance. Although subsistence resources are known to be very important to local communities, the exact value of these resources is not possible to quantify in monetary terms at this point. For a discussion of the effects on the demand and availability of these resources, see the Subsistence section of this chapter.

Recreation And Tourism Industry

During the 1980's, tourism became a major industry in Southeast Alaska. Cruiseships traveled the Inside Passage making regular stops at Southeast ports in record numbers. Between 1980 and 1986, cruiseship passenger numbers increased by nearly 90 percent. Total visitors to Southeast Alaska grew from 205,000 in 1983 to 350,000 in 1986. The tourist season also expanded to include much of May and September. Its economic significance is likely to increase.

Table 3-87
Recreation and Tourism Indicators for Southeast Alaska

Year	Southeast Cruiseship Passenger Numbers *1	Southeast Ferry System Use *2	Scenic Flight Passengers Misty Fiord *3
1975	46,279	230,000	NA
1980	86,815	276,000	3,000
1981	83,566	282,000	6,300
1982	87,358	300,000	5,200
1983	99,706	308,000	5,300
1984	118,781	311,000	7,000
1985	137,005	313,000	12,000
1986	164,400	296,070	11,900
1987	202,000	326,644	12,200
1988	198,870	344,209	NA

*1 From U.S. Customs Data as collected by McDowell Group, Juneau, Alaska.
*2 From Doug Burton, Alaska Marine Highway Program - Traffic Division (465-3946), Annual Traffic Reports - "Traffic Volumes by Port" Represents Boarding Passenger numbers.
*3 From Misty Fiords National Monument (225-2148).

Marketing studies by the Alaska Division of Tourism indicate that "scenery, forest, mountains, out-of-doors" and "wilderness, unspoiled, rugged" were the top interests appealing to potential visitors (Bright 1985). Resident recreation also increased during the 1980's as indicated by fishing and hunting license sales.

Unlike other industries, the tourism and recreation "industry" is not a single industry, but a composite of many that serve more than tourists. For example, retail trade, service, and transportation serve tourists as well as local industries and residents. The labor force and employment associated with tourism and recreation are different than manufacturing. The jobs tend to be highly seasonal and low paying.

Table 3-88
Recreation and Tourism Employment In Southeast Alaska, in Number of Jobs

Year	Direct Employment	Total Employment
1980	2,100	3,000
1981	2,200	3,125
1982	2,300	3,250
1983	2,400	3,400
1984	2,500	3,550
1985	2,600	3,675
1986	2,700	3,825
1987	2,800	3,925
1988	2,750	3,900

Source: USDA Forest Service IPASS Analysis, March 1990.

Employment and Income: Effects of the Alternatives

Assumptions and Models

The mix and level of goods and services provided in each alternative has the potential to affect the number of jobs throughout Southeast Alaska. In estimating job impacts it is assumed that other supply and demand factors affecting "markets" for Forest products and uses remain constant. This assumption becomes more tenuous the further out in time projections of effects are made. For example, the amount of timber offered for sale by the Project Area is not, and will never be, the only factor that affects the number of timber industry jobs. Worker productivity, interest rates, import and export levels, production and shipping costs, regional competition, private and public land harvest levels and policies, and other factors all affect the supply of and demand for timber and the subsequent number of jobs.

The number of jobs generated from the Project Area associated with each alternative was estimated using an input-output model called Interactive Policy Analysis Simulation System, or IPASS for short. In this model, estimates are a function of changes in final demand resulting from changes in output levels. Changes in output or activity levels initiate expenditures in various sectors of the local economy which trigger the change in jobs (and income).

National Forest Timber Employment

Future timber employment is based on 8.67 total jobs per million board feet used in the most recent Timber Sale Program Information Reporting System. Timber employment is derived by multiplying 8.67 by the total timber volume harvested for each alternative (Table 3-89).

Table 3-89
CPOW Contributions to Projected Timber Employment

Year	Alt.1	Alt.1a	Alt.2	Alt.3	Alt.4	Alt.5
1993	0	0	231	230	216	231
1994	0	0	676	665	627	667
1995	0	0	702	691	651	693
1996	0	0	988	972	916	975

SOURCE: Timber Sale Program Information Reporting System (TSPIRS), USDA For.Serv.

Commercial Fishing Employment

In estimating jobs associated with commercial fishing, the assumption is that two-thirds of the total fish production in Southeast Alaska is salmon and that 80 percent of the salmon originate from National Forest lands. The result is that 2,505 of the 4,727 current jobs related to commercial fishing are assumed attributable to the Tongass. It is also assumed that these 2,505 jobs change at the same rate as the commercial fish habitat capability on the Forest. Timber harvest and related activities have no measurable effect on fish under the current standards and guidelines and management area prescriptions (see Fisheries section of this chapter). Commercial fish habitat capability will remain constant at 22.4 in all alternatives. Consequently, commercial fish related jobs attributable to the Project Area are estimated to remain constant at 507 jobs in all alternatives.

Cumulative Effects

Cumulative effects on employment are best displayed in the TLMP Draft Revision (1991a), Alternative P. This analysis indicates that for the Ketchikan Area as a whole, National Forest system timber and commercial fishing employment will remain fairly constant, while recreation and tourism employment will increase in the future. However, the CPOW Project Area's contribution to total National Forest system timber employment will decline in the near future as the supply of old growth timber is reduced due to harvesting. In the long term, employment will once again increase as second-growth timber becomes available for harvest.

Recreation And Tourism Employment

Recreation and tourism jobs were not estimated for this analysis due to the limited size of the Project Area. Recreation and Tourism employment are more appropriately analyzed at the Forest Plan level where overall supply, demand, use, and availability of substitutes can be taken into account. This project does not affect recreation use or employment in a manner significantly different than estimated in the TLMP Draft Revision. Therefore, the overall recreation use and employment estimated for the Project Area in the Forest Plan Revision will apply to all alternatives.

Net Cash Flow and Payments to State: Affected Environment

Table 3-90 shows the total receipts from the Ketchikan Area timber program and payments to the State of Alaska. Twenty-five percent of all monies received (including purchaser road credits) from the Ketchikan Area is paid to the State of Alaska. The funds are generally used to benefit public schools and public roads. The amount of funds contributed in the past have not comprised a significant portion of the total public school and public road budgets for the cities and boroughs of Southeast Alaska.

Table 3-90
Ketchikan Area Receipts and Payments to the State Of Alaska, FY 1980-1990

Fiscal Year	Receipts *1	Payments to Alaska
1980	26,024,494	6,506,124
1981	15,007,944	3,751,986
1982	21,622,764	5,405,691
1983	5,365,915	1,341,479
1984	4,063,189	1,015,797
1985	209,231	52,308
1986	1,967,240	491,810
1987 *2	-2,033,575	---
1988	1,232,672	308,168
1989	20,183,133	5,045,783
1990	35,544,272	8,886,068
Total	129,187,278 *3	32,805,213

SOURCE: ANILCA 706(a) Draft 1988 Supply and Demand Report Number 8, and 1990 Timber Sale Program Information Reporting System (TSPIRS).

*1 Capital investments such as permanent roads, bridges, log transfer facilities, and timber stand improvements also contribute to the total assets of the Tongass National Forest, reduce future management costs, and are scheduled to achieve management objectives described in the Tongass Land Management Plan.

*2 Tongass receipts for fiscal year 1987 were negative as a result of Comptroller General Decision B-224730 of March 31, 1987 to retroactively implement the emergency rate redeterminations for short-term sales. Without the reduction, Tongass receipts would have been positive by $2,139,943. As a result of the negative receipt, no payments to the State were made in 1987.

*3 Does not include receipts foregone as a result of the Federal Timber Contract Payment Modification Act. Estimated total value of affected contracts was approximately $54.5 million prior to the Act if all volume were harvested. Total value of the affected contracts as a result of the Act was approximately $1.2 million. The difference of $53.3 million represents receipts foregone, thus, the total Tongass receipts for the period fiscal years 1980-88 would have been $126.8 million.

Net Cash Flow and Payments to State: Effects of the Alternatives

Dollar payments to the State of Alaska are based on the 25 percent formula for uses of the Tongass land and resources that generate income for the Federal government. Ninety-nine percent of the payments to the State from Federal receipts are generated from timber sales. Money returned to the State is earmarked for use on public schools and roads. When money returns drop, the state must come up with other sources of revenues to maintain the same quality and quantity of school and road programs. This, in turn, may decrease the money available for other programs.

Table 3-91 displays payments to the State of Alaska by alternative. Under anticipated mid-market conditions, Alternatives 1 and 1a would not generate any payments to the state, while Alternative 5 would generate up to $2.7 million. These alternatives represent the range within which the other alternatives fall.

Table 3-91
Payments to State of Alaska, by Alternative, in Thousands of Dollars

Year	Alt. 1	Alt.1a	Alt. 2	Alt. 3	Alt. 4	Alt. 5
1993	0	0	604	595	625	592
1994	0	0	1,746	1,714	1,803	1,714
1995	0	0	1,813	1,780	1,873	1,779
1996	0	0	2,552	2,509	2,632	2,502
TOTAL	0	0	6,715	6,597	6,933	6,587

Table 3-92 displays the estimated fiscal impact of the CPOW project. The mid-market value (average pond log value of timber harvested 1980-1988) of the timber which could be offered in each alternative was compared with the estimated costs (capital investments plus operating expenses) of the project. The table displays the anticipated total revenue, total costs, and net revenue all in 1990 dollars, volume harvested, and net return per MBF.

The project is anticipated to produce revenues in excess of costs for all alternatives except Alternatives 1, 1a, and 3.

Table 3-92
Estimated Fiscal Effects of the CPOW Project (First Decade Average)

Item	Units	Alt.1*	Alt.1a*	Alt.2	Alt.3	Alt.4	Alt.5
Costs	$1,000,000	2.0	2.0	11.0	10.8	10.2	11.0
Revenues	$1,000,000	0.0	0.0	10.8	7.9	9.8	11.7
Net Revenues	$1,000,000	-2.0	-2.0	-0.2	-2.9	-0.5	-0.8
Harvest	MMBF/Year	0.0	0.0	300.0	295.0	278.0	296.0
Net Revenue Per MBF	$/MBF	NA	NA	- .72	- 9.86	-1.64	-2.66

*Cost includes expenses of EIS preparation over a two-year period. Additional costs could be incurred if the no-action alternative results in a breach of the Long-Term Contract.
SOURCE: USDA Forest Service FORPLAN Analysis.

Cumulative Effects

The cumulative effects on net cash flow and payments to the state are displayed in the TLMP Draft Revision (1991a), Alt.P. This analysis indicates that for the Ketchikan Area as a whole, the timber program will provide a positive return on payments to the state which will remain constant at levels exceeding the historic average. However, the CPOW Project Area's contribution to total payments to the state will decline in the near future as the supply of old growth available for harvest is reduced. In the long term, payments to the state will once again increase as second-growth timber becomes available for harvest.

Economic Efficiency: Affected Environment

The National Forest Management Act of 1976 (NFMA) set forth explicit requirements for economic efficiency analysis of Forest management proposals. While economic efficiency must be analyzed and considered, it is not the sole decision criterion. Although the Forest Service has generally tried to achieve cost-efficient management (lowest possible input cost per unit of output), systematic evaluation of all costs and benefits from practices and activities has been undertaken only in recent years.

The measure of economic efficiency applied in formulating and evaluating alternatives is Net Public Benefits (36 CFR 219.1(a) and 219.12(f)). Net Public Benefits (NPB) are the sum of Present Net Value (PNV) and non-priced commodity values. PNV is the difference between the discounted value of all outputs to which monetary values or established prices are assigned and the total discounted costs of managing the area. Examples of nonpriced benefits include scenic quality, wildlife habitat, and community stability. Values of some non-priced commodities are inferred from observations of indicators such as the number of participants, tolerance of congestion, and expense of participation.

The dominant nonpriced commodities for the CPOW project are represented by the public issues. One function of the public involvement process, which contributed to the project issues, was the inference of nonpriced commodity values. Since the inferred demand for nonpriced commodities is subjective, a range of production of priced and nonpriced commodities is provided by the alternatives considered.

Economic Efficiency: Effects of the Alternatives

Table 3-93 is the primary display of economic efficiency by alternative. This table summarizes the changes in present net value between alternatives. The alternatives are ranked in order of descending PNV. This figure represents the economic efficiency of each alternative, or the difference between benefits and costs associated with the alternatives. Each alternative has a specific management strategy or emphasis which requires certain timber harvest levels that may not be the most economically efficient solution for the Project Area.

Historically the timber market has been cyclic, with sharp peaks and valleys in pond log value. A $20/MBF change in market price can mean as much as a 100 MMBF swing in the ability of the Project Area to provide an economic supply. Therefore, the PNV yardstick as it relates to the timber revenue component is subject to large fluctuation from year to year.

Table 3-93
Present Net Value Comparison of Alternatives

Alternative	Present Net Value (dollars)
Alt. 5	702,150
Alt. 2	- 192,624
Alt. 4	- 406,579
Alt. 1	-1,923,077
Alt. 1a	-1,923,077
Alt. 3	-2,593,914

Timber Demand Analysis: Affected Environment and Effects of the Alternatives

Ketchikan Area Timber is traded in the Pacific Rim Market. Over 90 percent of the wood pulp produced in Alaska is exported. The solid wood products (logs, cants and lumber) are shipped to Japan, Korea, The Peoples Republic of China, Taiwan, and Canada. The dissolving pulp produced from the hemlock and lower grade spruce logs is shipped to a wider array of countries. For example, in 1988, pulp products were shipped from Alaska to Argentina, Austria, Bangladesh, Belgium, Bulgaria, China, Egypt, France, West Germany, India, Indonesia, Iraq, Japan, and six other foreign countries. Approximately 15 percent of the dissolving pulp produced in Alaska is shipped to destinations in the continental United States. The Pacific Rim demand for wood products far exceeds the productive capability of the Ketchikan Area. The Ketchikan Area is a very small player in a very large market. It is anticipated that the Pacific Rim market will be able to purchase all the wood products which can be supplied.

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TRANSPORTATION AND FACILITIES

Key Terms

Access Management - aquiring rights and developing and maintaining facilities needed by people to get to and move through public lands
A-Frame LTF - log transfer facility system which consists of a stationary mast with a falling boom for lifting logs from trucks to water. This system is generally located on a shot rock embankment with a vertical bulkhead to access deep water, accommodating operations at all tidal periods.
Aquatic Habitat Management Unit (AHMU) - a mapping unit that displays an identified value for aquatic resources; a mechanism for carrying out aquatic resource management policy
Arterial Roads - roads usually developed and operated for long-term land and resource management purposes and constant service
Chain-slide LTF - log transfer facility system which consists of a gravity slide ramp for sliding log bundles into the water, with a chain assist system to slow the velocity of the logs entering the water.
Collector Roads - collect traffic from Forest Local roads; usually connect to a Forest Arterial road or public highway
Local Roads - provide access for a specific resource use activity such as a timber sale or recreational site; other minor uses may be served
Log Transfer Facility (LTF) - a facility that is used for transferring commercially harvested logs to and from a vessel or log raft, or the formation of a log raft

Affected Environment

Introduction

The transportation system on Prince of Wales Island evolved almost entirely from the harvest of timber products. Extensive road systems were started at Hollis and Coffman Cove by the Ketchikan Pulp Company (KPC) beginning in the mid-1950's. In 1962, KPC operations at Hollis were moved to Thorne Bay. Since 1962, other transportation systems were developed from logging camps at Thorne Bay, Ratz Harbor, Whale Pass, Labouchere Bay, El Capitan, Naukati, Winter Harbor, 12-Mile Arm, and Polk Inlet. In the early 1980's, tie roads were constructed to connect to Labouchere Bay, Whale Pass, Naukati and Coffman Cove.

The Forest Transportation System includes three types of roads: Arterials, Collectors and Locals. Arterial and Collector roads are usually maintained for use by passenger vehicles and are normally designed for higher truck speeds than Local roads. Most Local roads are not designed to accommodate passenger vehicles. Construction of Local roads for timber harvesting activity occurs on Prince of Wales Island at rate of between 50 and 80 miles per year. In addition, 20 to 30 miles of Local road are reconstructed annually.

The transportation system of the CPOW Project Area can be broken into four categories: (1) State Highways; (2) Forest Development Roads; (3) Log transfer Facilities; and (4) Trails.

State Highways

There are 78 miles of State Highway administered and maintained by the Alaska Department of Transportation on Prince of Wales Island. State Highway 924 connects to the Alaska Ferry terminal at Hollis, and to the communities of Klawock and Hydaburg. Highway 929 connects Craig and Klawock and continues north past the Control Lake Junction to Thorne Bay.

Forest Development Roads (FDR)

There are 1,478 miles of Forest Development Roads (FDR) on Prince of Wales Island, approximately 517 miles of which are within the Project Area. Approximately 140 miles can accommodate all vehicle types, and 430 miles are limited to high ground-clearance vehicles.

National Forest roads in the CPOW Project Area are constructed to standards appropriate for timber harvest, considering safety, cost of transportation, and impacts on lands and resources. The Arterial and Collector road systems on Prince of Wales Island are virtually complete, although minor additions to the system may be made, depending on the selection of harvest areas and log transfer facility permit approvals. The Arterial/Collector system roads have been constructed to a single lane width with turnouts and with rough shot rock surface, but built wide enough to accommodate future crushed gravel surfacing. They are designed for heavy off-highway loads.

The State of Alaska, the Federal Highway Administration, and the USDA Forest Service are cooperating to reconstruct the Forest Development Road from Control Lake to the Coffman Cove intersection. Reconstruction on this road is expected during the life of the CPOW project.

Log Transfer Facilities

The transportation of harvested timber on Prince of Wales Island to the KPC mill at Ward Cove on Revillagigedo Island requires that the log bundles be removed from the log trucks, placed in the water, rafted to the sort yard at Thorne Bay (or trucked directly to the Thorne Bay facility), and finally rafted to the mill at Ward Cove. The cost of timber transport by way of log trucks is more expensive than the cost of rafting and towing. For this reason, Log Transfer Facilities have been constructed in the past at various locations around the Project Area. There are now five existing LTF's and one abandoned facility that have transported National Forest system timber on the Project Area (see separate map packet).

The five currently active LTF's are sufficient to service all timber that would be harvested by this project. No new LTF's are proposed for development.

The existing facilities at Naukati, Whale Pass, Coffman Cove, and Winter Harbor use the A-Frame method of transferring logs to the water. This system consists of a stationary mat with a falling boom for lifting logs from the truck to the water. This system is generally located on a shot rock embankment with a vertical bulkhead to access deep water, accommodating operations at all tidal periods. The Thorne Bay facility consists of a gravity slide ramp for sliding log bundles into the water, with a chain assist for slowing the velocity of bundles entering the water. Ketchikan Pulp Company is the permit for the Coffman Cove and Thorne Bay sites.

Trails

There are currently five miles of inventoried trail on the Project Area. Trail management will take advantage of opportunities created by other management activities. All new trail construction or major reconstruction will be covered by a separate NEPA document.

Effects of the Alternatives

This section analyzes the effects of the alternatives upon the development and management of the Forest road system. The effects of the transportation system on other resources are considered in depth in the sections relating to those resources (soils, water, visuals, fisheries, wildlife, etc.). This section focuses on the effects of each alternative on the transportation system, and will be grouped into the following categories: (1) Construction and Costs, (2) Road Development, (3) Access Management, (4) Log Transfer Facilities. The analysis of the effects of the alternatives on LTF's also includes a discussion of the effects of LTF's on the marine benthic environment.

Road development patterns are similar from one alternative to another due to the location of the resource being used, terrain characteristics, and development costs. Roads are located to minimize disturbance on the land, yet provide access to resources. Thus, road routes generally follow routes of favorable terrain where practicable.

Construction and Costs

The estimated development costs for each alternative are summarized in Table 3-94

Table 3-94
Transportation Miles and Costs

	Alt.1	Alt.1a	Alt.2	Alt.3	Alt.4	Alt.5
New Construction Miles						
Arterial	0	0	0	0	0	0
Collector	0	0	2.0	2.0	2.0	2.0
Local	0	0	90.2	108.6	105.9	78.1
Total Construction MM$	0	0	13.4	16.1	15.7	11.7
Heavy Reconstruction Miles	0	0	29.5	26.8	28.4	33.5
Total Reconstruction MM$	0	0	2.2	2.0	2.1	2.4
Bridge Construction/Reconst.						
Total Bridge Const. MM$	0	0	0.5	0.5	0.2	0.5
Fish Timing Costs MM$	0	0	0.3	0.3	0.2	0.3
Total Construction and Reconstruction Costs MM$	0	0	16.4	18.8	18.2	14.9

MM$ = Millions of Dollars

Road Development

Road development includes the expansion of the current road system in all alternatives except Alternatives 1 and 1a.

In general, changes in the road system are needed because of the amount and spatial arrangement of resource areas and the amount of harvesting that would occur in new undeveloped areas. Proposed new roads are needed to harvest the timber volume associated with each respective alternative. The total planned roads, new and existing, are the roads needed to harvest the timber volume associated with each alternative (see Table 3-95).

Table 3-95
Changes in Total Transportation System (Miles)

	Alt. 1	Alt.1a	Alt. 2	Alt. 3	A.t. 4	Alt. 5
Existing Roads* 89-94	410	410	410	410	410	410
CPOW Specified Roads	0	0	92	111	109	80
Total Planned Roads	410	410	502	521	519	490

* Approximate existing miles; includes private roads.

Expansion of the road system requires: (1) construction of varying classes of roads (Arterial, Collector, and Local); (2) reconstruction of some existing roads; (3) construction and reconstruction of varying types of major drainage structures; and (4) coordination of construction activities with fish and wildlife needs.

Construction

Three classes of road would be constructed as part of the proposed project, each of which has different projected uses and construction standards. The three classes are: Arterial, Collector, and Local roads. Temporary roads, which are short-term roads for timber harvest activities only, were considered Local roads for analysis purposes since these roads are similar to Local roads.

Arterial and Collector roads are generally mainline system roads requiring higher standards and heavier investment to provide prolonged multiple use. These roads can be built to lower standards initially and upgraded as use is intensified. Thus the logging operator may construct Arterial and Collector roads to low or medium standards depending upon use.

Local roads tend to be utilized intermittently allowing use of lower standards. Thus Local roads are generally less costly than the Arterial and Collector roads. These roads may have use restrictions during harvest activities that limit public access.

The development of the Arterial/Collector/Local road system occurs in all alternatives except Alternatives 1 and 1a, the no-action alternative. Alternatives 3 and 4 develop the most miles (109 and 106 respectively) while Alternative 5 develops the fewest (78 miles). Local roads will be constructed in all action alternatives. The level of Local road development is not directly proportional to the level of harvest in each

alternative, because of differing spatial arrangements of the harvest units between alternatives.

Alternative 3 contains the highest level of development, and has the highest costs. Alternative 5 contains the lowest level of development and the lowest cost. The miles and cost of roads to be developed are shown by class in Tables 3-96 and 3-97.

Table 3-96
Miles of Road Development

Road Class	Alt.1	Alt.1a	Alt.2	Alt.3	Alt.4	Alt.5
Arterial Miles	0	0	0	0	0	0
Collector Miles	0	0	2.0	2.0	2.0	2.0
Local Miles	0	0	90.1	108.6	105.9	78.1
Total	0	0	92.1	110.6	107.9	80.1

Table 3-97
Costs of Roads and Major Drainage Structures, in Dollars

Alt. 1	Alt.1a	Alt. 2	Alt. 3	Alt. 4	Alt. 5
0	0	16,630,000	19,250,000	18,960,000	15,580,000

Reconstruction

There is reconstruction of existing roads associated with all action alternatives. Reconstruction activities range from major realignment and bridge replacement to minor blading and shaping of the existing road from proposed harvest units to the existing log transfer facilities.

Table 3-98 displays bridges and major culvert costs.

Table 3-98
Bridge/Major Culvert Costs

	Alt.1	Alt.1a	Alt.2	Alt.3	Alt.4	Alt.5
Construction/Reconstruction (Number of Structures)						
Permanent	0	0	0	0	0	0
Modular	0	0	5	5	2	5
Major Culvert	0	0	2	2	2	2
Construction Cost ($M)						
Permanent	0	0	0	0	0	0
Modular	0	0	420	420	168	420
Major Culvert	0	0	42	42	42	42
Total Bridge Cost ($M)	0	0	462	462	210	462

Construction Coordination with Fish and Wildlife

Development in some areas may require road construction or reconstruction near inventoried eagle nest trees. There is no road construction anticipated to be within 330 feet of any known eagle nest tree in the Project Area. It is standard practice to locate roads and other facilities at least 330 feet away from eagle trees unless terrain or physical requirements such as road grade prevent such an avoidance.

Some stream crossings have been identified as needing fish timing restrictions for construction of structures, to minimize impacts on fish eggs and fry. Generally these restrictions can be accommodated through planning and scheduling of the construction activities. However, in many cases, additional costs would be incurred to accommodate the timing restrictions. Such costs would include additional equipment mobilization and demobilization, increased construction actions for mitigation, and increased construction delays. The number of crossings, the acres of AHMU buffers affected by road crossings, and the number of crossings with fish timing and/or passage restrictions are displayed in Tables 3-99 and 3-100.

Table 3-99
AHMU Stream Crossings, Construction and Reconstruction, in Number of Crossings and Acres of Buffer Affected

	Alt.1	Alt.1a	Alt.2	Alt.3	Alt.4	Alt.5
New Construction						
AHMU Class I	0	0	5	4	5	4
AHMU Class II	0	0	3	6	3	2
AHMU Class III	0	0	11	10	19	17
Unclassified	0	0	70	77	68	73
Reconstruction						
AHMU Class I	0	0	7	7	4	8
AHMU Class II	0	0	2	1	3	2
AHMU Class III	0	0	11	8	6	9
Total Crossings	0	0	109	103	108	115
AHMU Buffer Acres Affected	0	0	3.44	4.30	3.44	2.58

Table 3-100
Number of Crossings With Fish Timing and/or Passage Restrictions

	Alt. 1	Alt.1a	Alt. 2	Alt. 3	Alt. 4	Alt. 5
Timing	0	0	27	28	21	23
Passage	0	0	17	18	15	16

VCU-specific locations for fish timing sites are located in the Planning Record.

Road Construction Within Stream Buffers

For a discussion of stream buffers, see Chapter 2, Mitigation Measures. Roads will be put in stream buffers only where it is the environmentally preferable choice and where it is consistent with safety. When these roads are laid out on the ground, care will be taken to keep as much of the road as possible outside of the stream buffer. In most cases, the limiting factor will be the type of terrain adjacent to the buffered stream which will govern how much of a given road segment can be located outside the buffer. This is consistent with the Tongass Timber Reform Act (TTRA).

Access Management

Access management (AM) is the management of existing and proposed Forest roads within the Project Area. The Access Management maps as presented in the 89-94 LTS EIS, Option B, portray generic areas representing varying road management strategies

for those areas. The Access Management map from the LTS EIS is available in the Planning Record. A schematic representation is shown in Figure 3-48.

The strategies are described in the subsequent access management AM classes. "Traffic Service Level" goals are included in the AM classes, and describe significant traffic characteristics and operating conditions for a road. A description of the Traffic Service Levels is located in the Planning Record. There will be no Traffic Service Level for temporary roads as these roads will be used only for timber harvest activities then closed by physically obliterating a portion of the roadway to prevent any type of vehicle access. Remain-open temporary roads may be used to provide short-term access for the Forest Service to perform silvicultural activities. These will be evaluated on a case-by-case basis and included in the Final EIS.

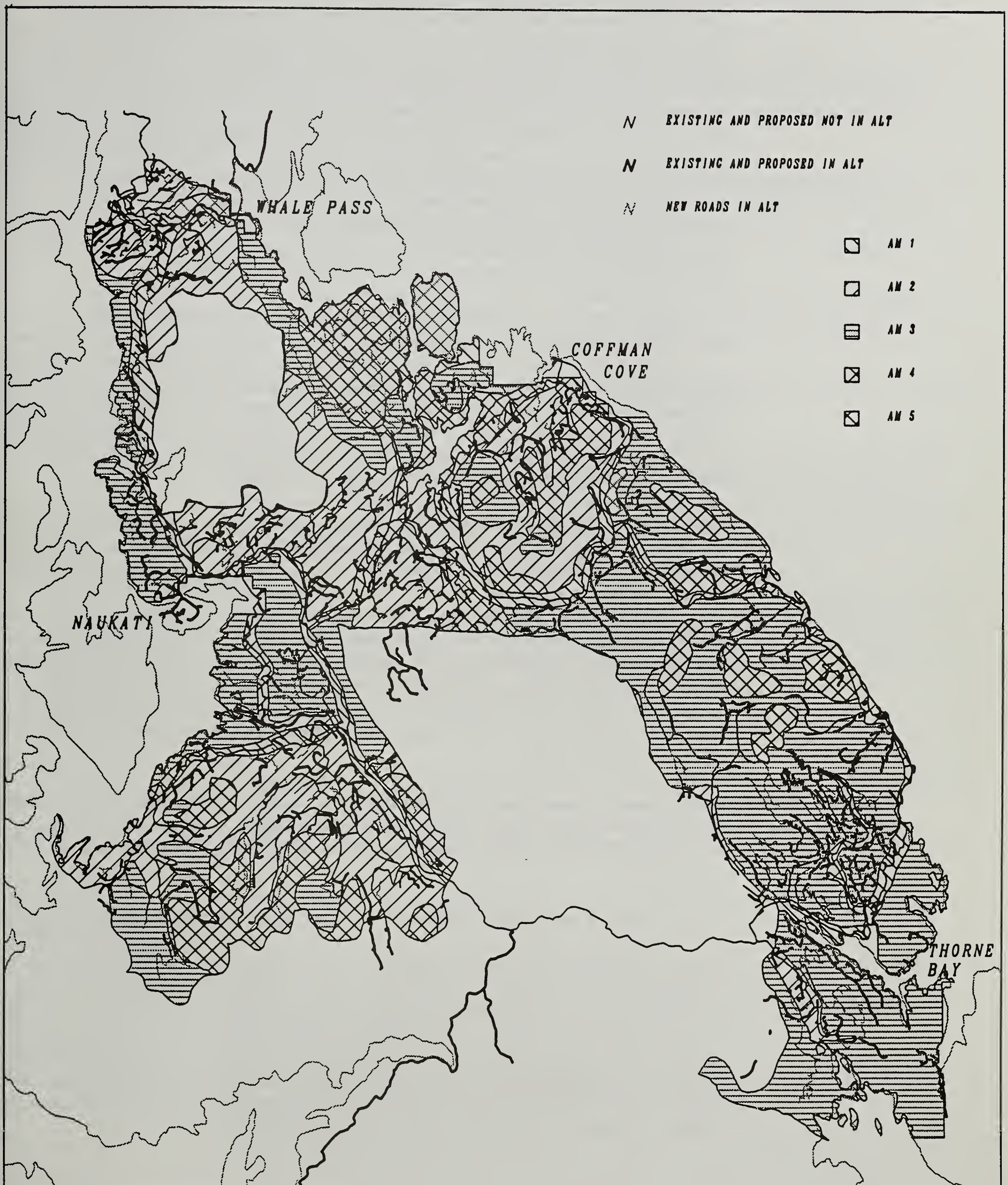
Table 3-101
Miles of Existing Roads on Project Area

Road Class	Miles Existing	New Roads (Alt.5)	Miles Closed
Arterial	88	0	0
Collector	107	2	8.7
Local	214	78	28.4
Temporary	118	10	53.3

In many instances, State, municipal, and private lands were not indicated on the Access Management Maps for display simplicity and concept purposes. The Access Management classes indicated on the maps are applied only to the Forest Service lands in the Project Area.

Road construction and reconstruction are associated with all CPOW action alternatives.

Figure 3-48
Access Management Schematic Map



Access Management Classes

AM Class I. *Description* - AM 1 refers to mainline (Arterial) roads on the Project Area. Key roads in this category are the Control Lake to Thorne Bay road; the Thorne Bay to Ratz Harbor road; Forest Development Road (FDR) 20 from Control Lake to Labouchere Bay; the junction of FDR 20 and FDR 23 to Coffman Cove, including the loop road past Luck Lake; FDR 2060 from the junction of FDR 20 to Naukati; FDR 27 and FDR 30 to Whale pass through to the Exchange Cove campsite; and the portion of FDR 15 as far as the El Capitan administrative site. All highways under the jurisdiction of the Alaska State Department of Transportation are included in this class. Continuous year round community access is a major component of traffic on these roads. The long-term Forest Service goal is to turn most of these roads over to the Alaska State Department of Transportation. This State agency is charged with providing public access to communities. It is also the only State or Federal agency with authority to plow snow for year round community access.

Prescription - Mainline roads within this class will have constant activity over a long period of time and will be managed to provide full service to the public. These roads are subject to safety conditions set forth in the Highway Safety Act. Use levels generally do not fluctuate significantly from year to year, and design criteria for roads, bridges and culverts will be applied to maintain long-term access. Maintenance levels also do not fluctuate significantly from year to year, and will be set at levels consistent with projected use. Mainline roads will not be closed. All short Local roads that juncture with the mainline roads will be subject to closure.

AM Class 2. *Description* - AM 2 areas have generally been open to public access in the past. Varying public uses—including hunting, fishing, motorized camping and wood gathering—have been established as a result of harvest roads being left open.

Prescription - Road systems within this class are projected to have intermittent levels of activity which fluctuate significantly from year to year. Permanent drainage structures will be installed to meet long-term access objectives; however, maintenance levels fluctuate in response to changing use levels. During periods of limited use, maintenance standards are sufficient to provide only for public safety and resource protection. Motor vehicle traffic may be restricted or reduced to prevent conflicts during harvest activity.

AM Class 3. *Description* - AM 3 is applied to areas containing key fish and wildlife habitat. These areas require access limitations to minimize disturbance to habitat areas. Hunting, hiking, fishing and other dispersed recreation activities are expected in these areas.

Prescription - Road systems within this class will have intermittent levels of activity with extended periods of non-use. All Collector roads will remain open, but traffic may be controlled during harvest activities. Intermittent closures (seasonal or up to several years) will be applied to Local roads to meet the objectives of providing non-motorized recreation activities, and avoiding impacts from poaching or increased hunting and fishing pressure on key wildlife and fish habitats. Portable bridges may be used to reduce construction costs, but these structures will be removed during periods of non-use. Local roads will be closed at the end of harvest activities. Predominant public use of the Local roads after closure will be foot traffic. The location, type, and length of closure will be determined prior to construction.

AM Class 4. *Description* - AM4 areas are important because they are one or more of the following: deer summer ranges, areas currently identified as primitive recreation areas, key estuary areas, or key recreation areas. They include such areas as Gold and Galligan Lagoon and the Karta LUD I release area.

Prescription - Road systems within this class will have intermittent levels of activity with extended periods of non-use. Traffic will be for motor vehicle use associated with harvest activity. Public vehicle traffic will be prohibited. Public access will be predominantly foot traffic.

Design criteria will be consistent with the objective of maintaining intermittent access. Within this area, low standard roads would generally be constructed. When in use, maintenance standards will be consistent with levels of use. Once the accessing activity has been completed, portable bridges will be removed from all roads.

Arterial and Collector roads will be constructed and maintained to accommodate intermittent harvesting activities. Permanent or portable bridges will be used. Public motor vehicle traffic will be prohibited when resource concerns warrant closure.

Local roads will be closed when intermittent harvest activities are completed. Portable bridges will be removed after harvest activities are completed.

AM Class 5. *Description* - TLMP LUD II designation (see Glossary) . These lands will be managed in a roadless state, retaining their wildland character. Primitive recreation facility development is permitted. Excluded uses are: (1) roads, except for specifically authorized uses, and (2) timber harvest, except to protect resource values or control insect infestation.

Exceptions. There may be unforeseen exceptions for some roads within the various "AM" classes. For example, disposition or development of state or private lands may require continuous access through Forest Service lands within an area indicating closure of all roads. The continuous access may be granted, especially if other routes are not feasible. Such situations will be evaluated on a case-by-case basis.

Road Closures

Road closures are executed for numerous reasons. Some examples are fish and wildlife protection, public safety, and inadequate maintenance funding levels. It may be necessary to close roads or portions of roads to specific uses. Roads under Forest Service jurisdiction can be closed by authority of CFR 36, ch.11, parts 212.7 and 261.

Roads closed by the Access Management plan will also be closed to all motorized vehicles including motorcyles, 3-wheelers, 4-wheelers, and snowmobiles.

Access Management Option B as presented in the Ketchikan Pulp Company 1989-1994 EIS will be added to and used as the Access Management Plan. The implementation of this plan will retain areas designated to be open in the KPC 1989-1994 EIS and close many new areas being accessed.

The amount of road mileage within each AM class and road class are located in the Planning Record.

Log Transfer Facilities (LTF's)

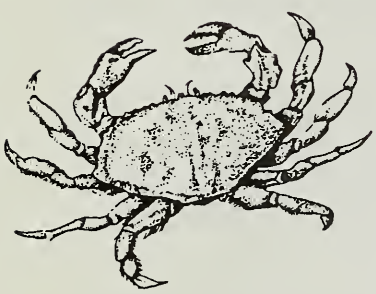
LTF's Required for the Alternatives

Existing Log Transfer Facilities (LTF's) will be required to harvest the timber scheduled in the alternatives. All alternatives will continue use of five existing sites except Alternatives 1 and 1a.. There is no need for new LTF sites to be constructed for any of the alternatives. The USDA Forest Service is the permit holder for all LTF sites to be used, with the exception of the Coffman Cove and Thorne Bay LTF site permits, which are held by Ketchikan Pulp Co.

Reconstruction work will be necessary on some existing facilities to ensure environmental and safety requirements are met. This work will be done as maintenance work on an as needed basis.

See separate map packet for locations and types of LTF's required to harvest timber in the alternatives.

Effects of Log Transfer Facilities on Marine Benthic Environment



During the transfer of logs from land to water, bark is sloughed off and may be deposited on the ocean bottom; bark also is continually sloughed off by agitation by wind and waves while the logs are in rafts. If the bark accumulates on the bottom, it can diminish habitat for bottom-dwelling crustaceans and molluscs, as well as hamper underwater vegetation used as food and rearing sites for marine fish and other organisms. All LTF's in the Project Area have been designed to maximize flushing suspended bark away from the LTF area to the open sea before it can accumulate on the bottom. In 1985 it was determined that discharge of bark into the water at an LTF was a discharge requiring a National Pollution Discharge Elimination System (NPDES) permit. The affected benthic environment under all proposed CPOW alternatives would continue to be the same as that affected by the existing LTF's, since no new LTF's are being proposed in this project.

Log transfer facilities will affect the marine benthic habitat (plants and animals that live in and on the bottom). Marine benthic habitat impacts are expected to be as follows:

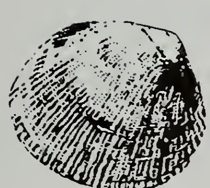
1. Structural Embankment: Estimated 0.23 acres affected per site.
2. Site Bark Deposition: Estimated 1.96 acres affected per site.
3. Raft Storage Bark Deposition: Unknown.

Structural Embankment. All LTF types occupy approximately the same amount of bottom area. For instance, the float off-push in a 10 percent grade system extends approximately 250 feet out into the water on a moderately sloped beach. This system is thus long and narrow. The slide and A-frame systems use more shoreline, and do not protrude out into the water as much as the float off-push in system. All systems, therefore, cover about the same bottom area, but in different configurations.

Site Bark Deposition. Two publications describe some of the general effects of log transfer facilities and log storage on the marine bethnic habitat. Sedell and Duval (1985) summarize the information available on the effects log transport and storage on marine resources and fisheries. Faris and Vaughn (1985) examined log transportation and log storage in Southeast Alaska.

Shultz and Berg (1976) examined 32 existing log transfer facility sites and found that 19 had bark accumulation, 8 had no bark accumulation, and 5 had traces of bark. The extent of bark accumulation ranged from 0 to 9.0 acres for 31 of the 32 sites. The 32nd site had accumulation of 182 acres that could not solely be attributed to log transfer activities. Faris and Vaughn (1985) reexamined the original data from Shultz and Berg (1976) and found that the average accumulation size was 1.96 acres for all sites excluding the 182-acre site. They speculate that bark and debris accumulation may be decreasing over time due to currents. No estimate was made on the length of time before bark accumulation was completely eliminated.

Faris and Vaughn (1976) also examined the extent of total damage to the marine benthic habitat in Southeast Alaska. Their results indicate that from the 90 currently permitted sites, a total of 176 acres would be affected (using the 1.96 acre average). This is .02 percent of the total estuarine area that is less than 60 feet deep. Moreover, when they examined all of the potential area of bark and debris accumulation from all permitted and proposed sites in Southeast Alaska, including all sites considered in the KPC Long Term Sale 1989-1994 EIS, they found that a total of 317 acres would be affected. This is 0.09 percent of the total estuarine area that is less than 60 feet deep in all of Southeast Alaska . This result corresponds with the conclusions of Sedell and Duval (1985) that the evidence of damage on important marine populations (bivalves, crabs and salmonoids) was inconclusive because of the small area of impact due to log transfer facilities. This evidence resulted in development of the current siting guidelines—e.g., avoiding crab habitat, shallow areas at the heads of bay, etc.—and suggests that impacts would be minimal.



The major effect of bark and debris accumulation is that little neck clams and bay mussels have been shown to be eliminated when as little as 4 to 5 inches of bark accumulates (Freese and O'Clair 1987). Further, Colin and Ellis (1979) reported molluscs and several polychaetes were excluded by bark debris thicker than 2.5 cm., and that effects of bark may last several decades. From this evidence, it can be assumed that other plants and animals that live in and on the bottom would probably be at similar risk.

Toxic substances leaching from bark can settle out in saltwater; therefore, these substances do not appear to be a major problem in open water where good circulation exists (Sedell and Duval 1985).

Certain dissolved substances (hydrogen sulfide and ammonia) recently have been shown to occur in open spaces between pieces of bark accumulated on the bottom (O'Clair and Freese 1988). O'Clair and Freese also note that it is not clear whether other toxic substances not measured in the study occur within bark accumulations. These substances do not enter the water above the bark. However, if dungeness crabs burrow into the bark deposit, it has been demonstrated that their reproductive ability, eating habits, and overall survival can be affected. It should be noted that this type of effect has been demonstrated in only one bark accumulation field (Rowan Bay log transfer facility) and that, in general, dungeness crabs were not found in bark accumulations at a number of other transfer facility locations. It is not known whether these effects would occur for other burrowing crab species. Although king crabs do not burrow, it is not clear whether this species is affected by bark and debris accumulation at log transfer facility sites.

Raft Storage Bark Deposition. The other potential effects associated with log transfer facilities are from log rafts and log storage in saltwater. The area under a log raft may be affected by bark accumulations with effects similar to but not as

concentrated as those discussed for log transfer facilities. In addition, if the raft is stored in a bay or cove for a long period of time, marine algae may be affected by shading. Occasionally, rafts stored in shallow depths may ground on the bottom. This would cause mechanical disruption or compaction of inter- and subtidal bottom habitats. This would be a short-duration effect because recolonization would begin shortly after the raft refloated, unless the site were repeatedly used and log rafts frequently grounded. Proposed and existing log storage areas in the Project Area are deep enough and are not expected to ground.

Barge LTF's. Barge log transfer facilities probably would have less effect on the marine environment than rafting log transfer facilities, although no studies are available for comparison. The rock embankment associated with the facility would be longer and slightly wider at the seaward end. The additional length and width would eliminate a larger intertidal area than a rafting log transfer facility breakwater. The longer length and wider seaward end in deeper water would require dredging and filling in the subtidal area Bark and debris would accumulate only in a small area around the extreme seaward end of the facility.

Logs are transferred from land to water at a Log Transfer Facility (LTF). After being sorted at the Thorne Bay sort yard, the log rafts are towed to the Ketchikan Pulp Co. mill at Ward Cove.

LAND STATUS

Key Terms
Alaska Native Claims Settlement Act (ANCSA) - provides for the settlement of certain land claims of Alaska Natives **Encumbrance**: a claim, lien, charge, or liability attached to and binding real property **Native Selection**: application by Native corporations to the USDI Bureau of Land Management for conveyance of a portion of lands withdrawn under ANCSA in fulfillment of Native entitlements established under ANCSA **State Selection**: application by Alaska Department of Natural Resources to the USDI Bureau of Land Management for conveyance of a portion of the 400,000-acre State entitlement from vacant and unappropriated National Forest System lands in Alaska, under the Alaska Statehood Act

Affected Environment

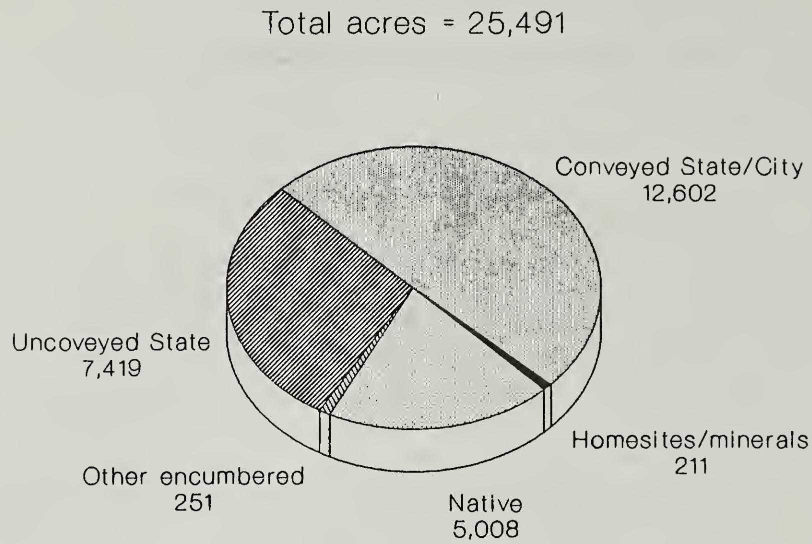
Land Ownership

Prior to 1971, the Tongass National Forest, Ketchikan Area land base was fairly stable, with only minor changes taking place as National Forest system lands were transferred to private homesites, canneries, and townsites. Beginning in the early 1970's, however, major land ownership changes were made as a result of major legislation, including the Alaska Native Claims Settlement Act (ANSCA) and the Alaska National Interests Land Conservation Act (ANILCA). Within the CPOW Project Area there are approximately 25,491 acres of State selections, Native selections, private ownership, and National Forest Administrative sites. In addition there are some USDA Forest Service administrative sites (191 acres) and lands being used under special use permits (15 acres). No timber harvest for the CPOW project is being proposed on any of these lands. Figure 3-49 shows the breakdown of these lands.

State Selections

The State of Alaska, under the Statehood Act of 1959, is entitled to select up to 400,000 acres from the National Forests in Alaska. To date 57 percent of the entitlement has been conveyed. Most of the remaining acres have been selected and are in the process of being conveyed by the Bureau of Land Management. These unconveyed selections within the CPOW Project Area are adjacent to Naukati (2,486 acres) and to Thorne Bay (4,933 acres). Because the State of Alaska was granted the opportunity to select more lands than they were entitled to receive conveyance, some of these lands may become available for National Forest harvest in the future.

Figure 3-49
Summary of Non-National Forest Lands



Private Land

Approximately 12,813 acres are in other ownership. These lands include state and city ownership adjacent to communities, as well as private individual homesites. These lands are found in the Coffman Cove area (2,156 acres), Thorne Bay area (9,592 acres), Whale Pass area (850 acres), Sarkar village (4 acres), private individual homesites (122 acres), and a single mineral survey (89 acres).

Native Selections

Native selections are authorized under 14(h)(8) of ANSCA. The grand total of all Native selections, including both conveyed and unconveyed tracts, is 5,008 acres. This includes 110 acres where Native selections have been made within the CPOW Project Area but have not been conveyed. In addition, there are two native allotments totaling 182 acres authorized by the Alaska Native Allotment Act of 1906 which provided that Native individuals who had occupied lands prior to the designation as National Forest could apply for conveyance of up to 160 acres. The Alaska Native Claims Settlement Act repealed the Native Allotment Act, thereby eliminating future allotments. Finally, there are 4,716 acres which have been withdrawn for selection by either a village or the regional corporation. They have not been selected but they are encumbered by the withdrawal. Timber harvest can take place but the Native corporation must be notified and the receipts put into an escrow account. Because Native Corporations were granted the opportunity to select more lands than they were entitled to receive conveyance, some of these lands may become available for National Forest harvest in the future.

Other Encumbrances

There are an additional 251 acres encumbered by withdrawals, for a U.S. Coast Guard lighthouse (245 acres) and for a homestead (6 acres). No timber is planned to be harvested within the withdrawal areas.

Special Use Permits

Several special use permits have been issued by the Forest Service for specific exclusive uses on National Forest system lands. These lands total 15 acres and include electronic sites, processing plants, construction camps, private residences, and transmission lines.

Administrative Sites

There are several Forest Service administrative sites, including Whale Pass (89 acres), Thorne Bay (50 acres), and the Thorne Bay sort yard (53 acres).

Effects of the Alternatives

There are 19 harvest units proposed by the alternative actions which lie adjacent to non-National Forest system land. These units must have boundary lines established prior to implementation to ensure that harvest does not encroach on non-National Forest system ownership. Table 3-102 shows these units and the alternatives under which they are considered for harvest.

Table 3-102
Proposed Harvest Adjacent to Non-National Forest System Land, by Alternative

Unit	Alternative
550-218	2 3 5
554.2-206	4 5
557-201	2 3 4 5
571-265	2 4 5
571-267	2 4 5
571-268	2 4 5
572-211	2 4 5
572-226	2
586-216	2 3 4 5
586-217	2 3 4 5
586-218	2 3 4 5
586-218B	2 3 4 5
586-220	2 3 5
586-225	4 5
586-228	2 3 4
586-229	2 4
586-232	2 3 5
598-206	5
598-218	2 4 5

Rights of Way

Logging adjacent to non-National Forest system lands may require right-of-way agreements for establishing tailholds or suspending logging cables over non-National Forest system roads, or land use agreements for establishing tailholds or suspending logging cables over non-National Forest system lands. It will also be necessary to directionally fall timber away from non-National Forest system lands. These requirements will be analyzed and negotiated on a case-by-case basis, depending on site specific logging/transportation systems.

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OTHER ENVIRONMENTAL CONSIDERATIONS

Irreversible Commitments

Irreversible commitments are decisions affecting non-renewable resources such as soils, wetlands, unroaded areas, and cultural resources. Such commitments are considered irreversible because the resource has deteriorated to the point that renewal can occur only over a long period of time or at a great expense, or because the resource has been destroyed or removed.

The construction of Arterial and Collector roads, to provide access to the Forest, is an irreversible action because of the long time it takes for a constructed road to revert to natural conditions. Also irreversible are the associated rock quarries which are developed in conjunction with these roads. Alternatives 1 and 1a have no new road construction while alternatives 2, 3, 4, and 5 will construct an average of 106.5 miles of new roads.

There are five roadless areas as identified in the TLMP Draft Revision (1991a) that may be affected by the CPOW project. A decision to develop these roadless areas would mean that their primitive character in terms of opportunities for solitude, remoteness, and development of wilderness skills would irreversibly gone. Table 3-65 in the Recreation section of this chapter shows the overall size of these roadless areas and how many acres would be harvested in them by alternative. Alternatives 1 and 1a schedule no timber harvest in roadless areas; under the range of action alternatives (Alts.2–5), approximately 2,900–5,400 acres of currently roadless area would be irreversibly committed.

Old-growth habitat lost due to logging can be considered an irreversible effect since it is not expected to regain old-growth characteristics for at least 200 years. From seven to eight percent of acres in the Project Area would change under the range of action alternatives 2–5. See Table 3-2 in the Old-Growth and Biodiversity section of this chapter.

Loss of soil due to erosion and mass failures is an irreversible commitment. However due to the incorporation of Best Management Practices (BMP's), Forest Plan standards and guidelines, and mitigation measures specified in this document, it is not anticipated that there would be any significant soil loss under any alternative.

Loss of cultural resource sites resulting from accidental damage or vandalism would be an irreversible commitment of resources. The standards and guidelines, survey methodology prior to activities, and mitigation measures specified in this document provide reasonable assurance that there would be no irreversible loss of cultural resources.

Loss of cave resources resulting from accidental damage or vandalism in the Project Area would also be an irreversible commitment of resources. The standards and guidelines, reconnaissance prior to land disturbing activities, and mitigation measures specified in this document provide reasonable assurance that there should be no irreversible loss of cave resources.

Irretrievable Commitments

Irretrievable commitment of natural resources means loss of production or use of resources due to management decisions made in the alternative. This represents opportunities forgone for the period of time that the resource cannot be used.

Foregoing timber harvest opportunities at this time in certain areas due to resource concerns or economics may represent an irretrievable commitment of resources because that volume cannot be harvested. The commitment is irretrievable rather than irreversible, because future technological advances could make harvest of these areas possible and feasible. The Multi-entry Logging Plan (MELP) done for this project identified 58,352 acres of this type in the Project Area.

The reduction in the visual quality of an area due to timber harvesting will be an irretrievable commitment of resources. The commitment is irretrievable since viewsheds will typically heal from a visual quality standpoint after about 40 years. After this time the second-growth trees will have the color and height needed so as not to be evident to the casual observer. Alternatives 1 and 1a will have no irretrievable commitment of visual quality. Alternatives 2, 3, 4 and 5 will irretrievably commit visual resources due to timber harvesting.

Short-term Uses and Long-Term Productivity

The use of natural resources for long-term sustained yield is at the basis of National Forest management and direction. The proposed timber harvesting under the Best Management Practices (BMP's), Tongass Land Management Plan standards and guidelines, Proposed Tongass Land Management Plan Revision standards and guidelines, and Regional Guide direction will result in no long-term loss in productivity.

Possible Conflicts with Plans and Policies of Other Jurisdictions

The regulations for implementing NEPA require a determination of possible conflicts between the proposed action and the objectives of Federal, State, and local land-use plans, policies, and controls for the area. The major land-use regulations of concern are the Coastal Zone Management Act (CZMA), Section 810 of ANILCA, and the State of Alaska's Forest Practices Act. A discussion of each of these determinations is presented below.

Coastal Zone Management Act of 1976 (CZMA)

The CZMA was passed by Congress in 1976 and amended in 1990. This law requires Federal agencies conducting activities or undertaking development affecting the coastal zone to ensure that the activities or developments are consistent with approved state coastal management programs to the maximum extent practicable. The State of Alaska passed the Alaska Coastal Management Act in 1977 to establish a program that meets the requirements of the CZMA. It contains the standards and criteria for a determination of consistency for activities within the coastal zone.

Forest Service requirements for consistency are detailed in a Memorandum of Understanding between the State of Alaska and the Regional Forester, dated October 8, 1981. Standards against which the consistency evaluation will take place are: Alaska Statute Title 46, Water, Air, Energy, and Environmental Conservation; and the Alaska Forest Practices Act of 1990.

The Forest Service has designed all alternatives to ensure that the activities and developments affecting the coastal zone are consistent with approved coastal management programs to the maximum extent practicable.

Alaska National Interest Lands Conservation Act of 1980 (ANILCA)

Under Section 810 of ANILCA, agencies are required to evaluate the effects of proposed actions on subsistence uses of Federal land and to determine if the proposed action may significantly restrict subsistence opportunities. Refer to the the Subsistence section of this chapter for the evaluation of impacts to subsistence use as a result of the alternatives.

State of Alaska's Forest Practices Act of 1990

On May 11, 1990, the governor approved the legislature's major revision of the state's Forest Practices Act (FPA). The revised act significantly increases the state's role in providing protection and management for important forest resources on state and private lands. The revised Forest Practices Act will also affect National Forest management through its relationship to the Alaska Coastal Management Program and the Federal CZMA discussed above.

For National Forest timber operations, such as proposed for CPOW, the effect of the revised Forest Practices Act is essentially two-fold. First, it clarifies that the revised Forest Practices Act is the standard which must be used for evaluating timber harvest activities on Federal lands for purposes of determining consistency to the maximum extent practicable with the Alaska Coastal Zone Management Program. Secondly, it calls for minimum 100-foot buffers on all Class I streams, and recognizes that consistency to the maximum extent possible for purposes of the Alaska Coastal Management Program is attainable in Federal timber harvest activities using specific methodologies which may differ from those required by the revised Forest Practices Act or its implementing regulations.

The TTRA prohibited commercial timber harvesting within buffer zones established on all Class I streams and those Class II streams which flow directly into a Class I stream. Buffer zones have a minimum width of 100-feet slope distance from the edge of either side of the stream. In addition, the Forest Service is currently working with the Alaska State Division of Governmental Coordination on a revision of the Memorandum of Understanding (MOU) between the state the Forest Service. This revised MOU will establish the policies and procedures for coordinating state review of Forest Service programs and activities, including those covered by the Forest Practices Act and the Alaska coastal Management Program.

The Forest Service will evaluate the alternatives prior to completion of the Final EIS and the ROD to ensure that the activities and developments specifically covered by the Forest Practices Act are consistent with its provisions to the maximum extent possible.

Energy Requirements and Conservation Potential of Alternatives

The implementation of the proposed actions in the CPOW Project Area will require the expenditure of energy (fuel consumption). The amount of energy used varies by alternative based on timber volume harvested and miles of road constructed or reconstructed. The direct effect of the alternatives on energy requirements would be attributed to timber harvest, road construction and reconstruction, and travel necessary to administer the timber sale. Indirect energy requirements include processing wood products and the transport of the products to secondary processors and consumers. The estimated total fuel consumption required for each alternative is displayed in Table 3-103.

Table 3-103
Estimated Fuel Consumption (Millions of Gallons)

Activity	Alt.1	Alt.1a	Alt.2	Alt.3	Alt.4	Alt.5
Prep. and Admin. (1.56 gall/MBF)	0	0	0.468	0.460	0.437	0.462
Logging and Transport. (14.8 gall/MBF)	0	0	4.440	4.366	4.114	4.381
Road Constr. and Maint. (4,000 gall/mile)	0	0	0.752	0.800	0.820	0.764
Total consumption	0	0	5.660	5.626	5.368	5.607

SOURCE: D.Arrasmith 1992.
Note: The estimated fuel consumption for timber harvest activities is based on consumption per MBF of sawlog volume. Sawlog volume is estimated to be 79% of the total volume harvested.

Natural or Depletable Resource Requirements and ConservationPotential

All alternatives considered in detail are designed to conform to applicable laws and regulations pertaining to natural or depletable resources, including minerals and energy resources. Regulation of mineral and energy activities on the National Forest, under the U.S. Mining Laws Act of 1872 and the Mineral Leasing Act of 1920, is shared with the Bureau of Land Management (BLM). The demand for access to National Forest lands for the purpose of mineral and energy exploration and development is expected to increase over time.

The action alternatives propose road construction that will increase opportunities for access to the National Forest within the CPOW Project Area. This increased access may result in increased activity with regard to both known and potential mineral or energy resource occurrences. There are two known mineral prospects in the Project Area. These prospects indicate occurrences of copper, and gold. At this time, there does not seem to be much interest in the known mineral occurrences, as there are no mining claims. The actual potential for increased mineral or energy resource activity in the Project Area is not known, nor can an accurate estimate be made.

Urban Quality, Historic and Cultural Resources

The CPOW Project Area contains no urban areas. Therefore, the only applicable concern under this topic is with historic and cultural resources. The goal of the Forest Service's Cultural Resource Management Program is to preserve significant cultural resources in their field setting and ensure they remain available in the future for research, social/cultural purposes, recreation, and education. The direct, indirect, and cumulative effects of the alternatives on cultural resources have been evaluated. The result of this evaluation is the determination that there are adequate standards, guidelines, and procedures to protect cultural resources and to meet the goals of the Cultural Resource Management Program. Cultural resources are discussed further in the Cultural section of this chapter.

Consumers, Civil Rights, Minorities and Women

All Forest Service actions have the potential to produce some form of impact, positive and/or negative, on the civil rights of individuals or groups, including minorities and women. The need to conduct an analysis of this potential impact is required by Forest Service Manual and Forest Service Handbook direction. The purpose of the impact analysis is to determine the scope, intensity, duration, and direction of impacts resulting from a proposed action. For environmental or natural resource actions, such as proposed for CPOW, the civil rights impact analysis is an integral part of the procedures and variables associated with the social impact analysis. This analysis is discussed in the Socio-Economic section of this chapter.

The effect of the alternatives on consumers is reflected in the discussion of the various goods and services supplied as a result of the proposed actions. This analysis occurs throughout the chapter as an integral part of the analysis of the effects on other components of the environment.

Prime Farmland, Rangeland, and Forest Land

All alternatives are in keeping with the intent of Secretary of Agriculture Memorandum 1827 for prime land. The Project Area does not contain any prime farmlands or rangelands. Prime forest land does not apply to lands within the National Forest system. In all alternatives, lands administered by the Forest Service would be managed with a sensitivity to the effects on adjacent lands.

Threatened and Endangered Species, and Critical Habitat

There will be no adverse impacts to any Federally listed threatened or endangered species or critical habitat as a result of this project. No endangered or threatened wildlife species are known to occur in the Project Area, although Humpback whales and Stellar's sea lions are occasionally found in waters bordering the Project Area. The discussion of the effects of the alternatives on threatened, endangered, or sensitive species is presented in the Threatened and Endangered Species section of this chapter.

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Title 2500, Watershed and Air Management, Chapter 2554 "Soil Quality Monitoring"

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Glossary

Abiotic
Non-living.

Access
The opportunity to approach, enter, and make use of public lands.

Access Management
Aquiring rights and developing and maintaining facilities needed by people to get to and move through public lands.

Adfluvial Fish
Fish that do not go to sea, but live in lakes and enter streams to spawn.

Aelvin
Young salmon that are still attached to the yolk sac, which provides nourishment.

AHMU
See Aquatic Habitat Management Unit.

Aerial Harvest Systems
See Logging Systems.

Alaska National Interest Lands Conservation Act (ANILCA)
Passed by Congress in 1980, this legislation designated 14 National Forest wilderness areas in Southeast Alaska. Section 810 requires evaluations of subsistence impacts before changing the use of these lands.

Alaska Native Claims Settlement Act (ANCSA)
Public Law 92-203, 92nd Congress, 85 Stat. 2371-2551. Approved December 18, 1971, ANCSA provides for the settlement of certain land claims of Alaska natives and for other purposes.

Allowable Sale Quantity (ASQ)
The maximum quantity of timber that may be sold each decade from a national forest. This quantity, expressed in board feet, is calculated for the Tongass National Forest using timber utilization standards specified in the Alaska Regional Guide, the number and type of acres available for timber management, and the intensity of timber management. The ASQ was calculated at 4.5 billion board feet per decade for the Tongass National Forest.

Alternative
One of several policies, plans, or projects proposed for decision making.

Alluvium
A deposit of sand or mud formed by moving water.

Alluvial Fan
A fan-shaped deposit of sand, gravel, and fine material made by a stream where it runs out onto a level plain or meets a slower stream.

Amenity
Resource use, object, feature, quality, or experience that gives pleasure or is pleasing to the mind or senses. Amenity values typically are those for which monetary values are not or cannot be established.

Anadromous Fish
Fish that spend part of their lives in freshwater and part of their lives in saltwater (such as salmon, steelhead, sea-run cutthroat trout, and shad).

Analysis Area
A planning unit made up of two or more management areas identified in the Tongass Land Management Plan.

Appraisal
See Timber Appraisal.

Aquatic Habitat Management Unit (AHMU)
A mapping unit that displays an identified value for aquatic resources. It is a mechanism for carrying out aquatic resource management policy.
Class I AHMU: Streams with anadromous or adfluvial fish habitat. Also included is the habitat upstream from migration barriers known to have reasonable enhancement opportunities for anadromous fish and habitat with high value resident sport fish populations.
Class II AHMU: Streams with resident fish populations and generally steep (6 to 15 percent) gradient (can also include streams from 0 to 6 percent gradient where no anadromous fish occur). These populations have limited sport fisheries values and are separate from the high-quality sport fishing systems included in Class I. They generally occur upstream of migration barriers or are steep gradient streams with other habitat features that preclude anadromous fish use.
Class III AHMU: Streams with no fish populations but which have potential water quality influence on the downstream aquatic habitat.

Background
The distant part of a landscape. The seen, or viewed area located from 3 or 5 miles to infinity from the viewer. See also, Foreground and Middleground.

Beach Fringe Habitat
Non-forested habitat that occurs from the intertidal zone inland 500 feet, and islands of less than 50 acres; forested habitat that occurs from the intertidal zone inland 600 feet, and islands of less than 50 acres.

Bedload
Sand, silt, and gravel, or soil and rock debris rolled along the bottom of a stream by the moving water.

Benthic
Refers to the substrate amd organisms in and on the bottom of a body of water.

Best Management Practices (BMP)
Practices used for the protection of water quality. BMP's are designed to prevent or reduce the amount of pollution from nonpoint sources or other adverse water quality impacts while meeting other goals and objectives. BMP's are standards to be achieved, not detailed or site specific prescriptions or solutions. BMPs as defined in the USDA Forest Service Soil & Water Conservation Handbook are mandated for use in Region 10 under the Tongass Timber Reform Act.

Biological Diversity (Biodiversity)
The variety of life in all its forms and at all levels. This includes the various kinds and combinations of: genes; species of plants, animals, and microorganisms; populations; communities; and ecosystems. It also includes the physical and ecological processes that allow all levels to interact and survive. The most familiar level of biological diversity is the species level, which is the number and abundance of plants, animals, and microorganisms.

Biotic
Refers to life, living. See also, abiotic.

Board Foot (BF)
A unit of wood 12" X 12" X 1". One acre of commercial timber in Southeast Alaska on the average yields 28,000-34,000 board feet per acre (ranging from 8,000-90,000 board feet per acre). One million board feet (MMBF) would be the volume of wood covering one acre two feet thick. One million board feet yields approximately enough timber to build 120 houses or 75,555 pounds of dissolving pulp.

Bog
An undrained or imperfectly drained area with a vegetation complex composed of sedges, shrubs, and sphagnum mosses, typically with peat formation. See also, muskeg.

Bole
Trunk of the tree.

Broadcast Burning
Burning of an area that has been clearcut to remove logging slash from the site. Broadcast burning is done to prepare sites for regeneration or improve wildlife habitat.

Brush Disposal
Cleanup and disposal of slash and other hazardous fuels within the forest or project areas.

Buffer
The Tongass Timber Reform Act (TTRA) requires that timber harvest be prohibited in an area no less than 100 feet on each side of all Class I streams and Class II streams which flow directly into Class I streams. This 100-foot area is known as a buffer.

Canopy
See overstory.

Cant
A log partly or wholly cut and destined for further processing.

Capability
An evaluation of a resource's inherent potential for use.

Carrying Capacity
The maximum number of a species that can be supported indefinitely by available resources in a given area.

Cave
Any naturally ocurring void, cavity, recess, or system of interconnected passages which occurs beneath the surface of the earth or within a cliff or ledge and which is large enough to permit an individual to enter.

Cave Resources
Any material or substance occurring in caves on Federal lands, such as animal life, plant life, paleontological resources, cultural resources, sediments, minerals, speleogens, and speleothems.

Channel Types
The defining of stream sections based on watershed runoff, landform relief, and geology.

Class I, II, III Streams
See Aquatic Habitat Management Units.

Clearcut
The harvesting in one cut of all trees on an area. The area harvested may be a patch, strip, or stand large enough to be mapped or recorded as a separate class in planning for sustained yield. Clearcut size on the Tongass National Forest is limited to 100 acres, except for specific conditions noted in the Alaska Regional Guide.

Climax
A community of plants and animals which is relatively stable over time and which represents the late stages of succession under the current climate and soil conditions.

Code of Federal Regulations (CFR)
A codification of the general and permanent rules published in the Federal Register by the executive departments and agencies of the Federal Government.

Commercial Forest Land (CFL)
Productive forest land that is producing or capable of producing continuous crops of industrial wood and is not withdrawn from timber utilization by statute or administrative regulation. This includes areas suitable for management and generally capable of producing in excess of 20 cubic feet per acre of annual growth or in excess of 8,000 board feet net volume per acre. It includes accessible and inaccessible areas.

Commercial Thinning
Thinning a stand where the trees to be removed are large enough to sell.

Commodity
Resources with monetary (market) or commercial value; all resource products which are articles of commerce, e.g., timber and minerals.

Corridor
Connective links of certain types of vegetation between patches of suitable habitat which are necessary for certain species to facilitate movement of individuals between patches of suitable habitat. Also refers to transportation or utility rights-of-way.

Cover
Refers to trees, shrubs, or other landscape features that allow an animal to partly or fully conceal itself.

Cruise
Refers to the general activity of determining timber volumes and quality, as opposed to a specific method.

Cultural Resources
Historic or prehistoric objects, sites, buildings, structures, and their remains, resulting from past human activities.

Cumulative Effects
The impacts on the environment resulting from the addition of the incremental impacts of past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such actions. Cumulative impacts can result from individually minor but collectively significant actions occurring over time.

Current Timber Supply
Timber specified by the Forest Service that has not been rejected by the purchaser and that has undergone analysis under the National Environmental Policy Act (NEPA).

Cutover
Areas harvested recently.

DBH
Diameter at Breast Height. The diameter of a tree measured 4 feet 6 inches from the ground.

Debris avalanche
The sudden movement downslope of the soil mantle; it occurs on steep slopes and is caused by the complete saturation of the soil from prolonged heavy rains.

Debris flow
A general term for all types of rapid movement of debris downslope.

Debris torrents
Landslides that occur as a result of debris; avalanche materials which either dam a channel temporarily or accumulate behind temporary obstructions such as logs and forest debris.

Deer Winter Range
Locations that provide food and shelter for Sitka Black-tail deer under moderately severe to severe winter conditions.

Developed Recreation
Recreation that requires facilities that, in turn, result in concentrated use of an area, such as campgrounds and ski areas. Facilities in these areas might include roads, parking lots, picnic tables, toilets, drinking water, ski lifts, and buildings. See also, dispersed recreation.

Direct Employment
The jobs that are immediately associated with the Long-Term Contract Timber Sale, including, for example, logging, sawmills, and pulpmills.

Discounted Benefits
The sum of all benefits derived from the forest over the life of a project.

Discounted Costs
The sum of all costs incurred from the Project Area during its period of implementation.

Dispersed Recreation
Recreational activities that are not confined to a specific place and are generally outside developed recreation sites. This includes activities such as scenic driving, hiking, backpacking, hunting, fishing, snowmobiling, horseback riding, cross-country skiing, and recreation in primitive environments. See also, developed recreation.

Doline
A relatively shallow, bowl- or funnel-shaped depression ranging in diameter from a few to more than 3,000 feet. Also known as a sinkhole.

Down
A tree or portion of a tree which is dead and laying on the ground.

Draft Environmental Impact Statement (DEIS, or Draft EIS)
A statement of environmental effects for a major Federal action which is released to the public and other agencies for comment and review prior to a final management decision. Required by Section 102 of the National Environmental Policy Act (NEPA).

Duff
Vegetative material covering the mineral soils in forests, including the fresh litter and well decomposed organic material and humus.

Eagle Nest Tree Buffer Zone
A 330-foot radius around eagle nest trees established in a Memorandum of Understanding between the U.S. Fish and Wildlife Service and the Forest Service.

Effects
Effects, impacts, and consequences as used in this environmental impact statement are synonymous. Effects may be ecological (such as the effects on natural resources and on the components, structures, and functioning of affected ecosystems), aesthetic, historical, cultural, economic, or social, and may be direct, indirect, or cumulative.
Direct Effects
Results of an action occurring when and where the action takes place.
Indirect Effects
Results of an action occurring at a location other than where the action takes place and/or later in time, but in the reasonably foreseeable future.
Cumulative Effects

See Cumulative Effects.

Encumbrance
A claim, lien, charge, or liability attached to and binding real property.

Endangered Species
Any species of animal or plant that is in danger of extinction throughout all or a significant portion of its range. Plant or animal species identified by the Secretary of the Interior as endangered in accordance with the 1973 Endangered Species Act. See also, threatened species, sensitive species.

Endemic
Peculiar to a particular locality; indigenous.

Environmental Analysis
A comprehensive evaluation of alternative actions and their predictable short-term and long-term environmental effects, which include physical, biological, economic, social, and environmental design factors and their interactions. An EA is less comprehensive than an Environmental Impact Statement (EIS), and may result in a Finding of No Significant Impact; should the EA reveal significant impacts, a full EIS must then be conducted.

Erosion
The wearing away of the land surface by running water, wind, ice, gravity or other geological activities.

Escapement
Adult anadromous fish that escape from all causes of mortality (human-caused or natural) to return to streams to spawn.

Estuarine Fringe Habitat
A 1,000-foot timbered zone around an estuary.

Estuary
For the purpose of this EIS process, estuary refers to the relatively flat, intertidal, and upland areas generally found at the heads of bays and mouths of streams. They are predominately mud and grass flats and are unforested except for scattered spruce or cottonwood.

Even-aged Management
Management that results in the creation of stands in which trees of essentially the same age grow together. Clearcut, shelterwood, and other tree cutting methods produce even-aged stands. See also, uneven-aged management.

Executive Order
An order or regulation issued by the President or some administrative authority under his or her direction.

Existing Visual Condition (EVC)
The level of visual quality or condition presently occurring on the ground. The six existing visual condition categories are:
Type I: These areas appear to be untouched by human activities.
Type II: Areas in which changes in the landscape are not visually evident. The natural appearance of the landscape still remains dominant.

Type III: Areas in which changes in the landscape are easily noticed and may attract some attention. The change in landscape is noticeable, but it may resemble a natural disturbance.
Type V: Areas in which changes in the landscape are dominant and obvious. These changes appear to be major disturbances.
Type VI: Areas in which changes in the landscape are in glaring contrast to the natural landscape. The changes appear to be a drastic disturbance.

Fen
A tract of low, marshy ground consisting of organic terrain, relatively rich in mineral salts. See also, muskeg.

Final Environmental Impact Statement (FEIS or Final EIS)
The final version of the statement of environmental effects required for major federal actions under Section 102 of the National Environmental Policy Act. It is a revision of the Draft EIS to include public and agency responses to the draft. The decision maker chooses which alternative to select from the Final EIS, and subsequently issues a Record of Decision (ROD).

Fine
Minute particles of soil.

Fiscal Year
October 1 through September 30, e.g. Oct. 1, 1991 - Sept. 30, 1992 = FY92.

Fish Timing
A mitigation measure that restricts construction activities within an anadromous fish stream, to minimize impacts on fish eggs, fry, and migrating salmonids. The normal period allowing construction activities in fish streams is May 15 to August 20.

Floodplain
That portion of a river valley, adjacent to the river channel, which is covered with water when the river overflows its banks at flood stages.

Fluvial
Of or pertaining to streams and rivers.

Forage
To wander or go in search of food.

Forbs
Herbaceous plants that are not grasses or grass-like. Includes plants that are commonly called weeds or wildflowers.

Foreground
The stand of trees immediately adjacent to a scenic area, recreation facility, or forest highway; area located less than 1/4 mile from the viewer. See also, Background and Middleground.

Forest or Forest Land
National Forest lands currently supporting or capable of supporting forests at a density of 10 percent crown closure or better. Includes all areas with forest cover, including old growth and second growth, and both commercial and non-commercial forest land.

Forest and Rangeland Renewable Resources Planning Act of 1976 (RPA)
Amended in 1976 by the National Forest Management Act.

Forest Supervisor
The Forest Service officer responsible for administering a single national forest. The office of the Forest Supervisor for the Ketchikan Area of the Tongass National Forest is located in Ketchikan, Alaska.

Geographic Information System (GIS)
An information processing technology to input, store, manipulate, analyze, and display spatial and attribute data to support the decision-making process. It is a system of computer maps with corresponding site specific information that can be electronically combined to provide reports and maps.

Glide Channel
Channel types that occur on lowlands and landforms, and are mostly associated with bogs, marshes, or lakes.

Grabinski
A modified highlead cable logging system.

Groundwater
Water within the earth that supplies wells and springs.

Guideline
A preferred or advisable course of action or level of attainment designed to promote achievement of goals and objectives.

Habitat
The sum total of environmental conditions of a specific place that is occupied by an organism, population, or community of plants or animals.

Habitat Capability
The number of healthy animals that a habitat can sustain. Used in wildlife models to calculate rough population estimates for Management Indicator Species.

Haulout
An area of large, smooth rocks used by seals and sea lions for resting and pupping.

Humus
Substance of organic origin that is fairly but not entirely resistant to further bacterial decay.

IMPLAN
A computer-based system used by the Forest Service for constructing nonsurvey models to measure economic input. The system includes a data base for all counties in the United States and a set of computer programs to retrieve data and perform the computational tasks for input/output analysis.

Inclusions
Soil types that are not delineated on soil resource inventory maps because they are too small (in area) to be mapped at the scale used in the inventory at any locale.

Indicator species
See Management Indicator Species.

Indirect Employment
The jobs in service industries that are associated with the Long-Term Contract timber sale including for example suppliers of logging and milling equipment. See also, direct employment.

Inoperable Timber
Timber that cannot be harvested by any proven method because of potential resource damage, extremely adverse economic considerations, or physical limitations.

Interdisciplinary Team (IDT)
A group of people with different backgrounds assembled to research, analyze, and write a project Environmental Impact Statement. The team is assembled out of recognition that no one scientific discipline is sufficiently broad enough to adequately analyze a proposed action and its alternatives.

Irretrievable Commitments
Losses of production or use of renewable natural resources for a period of time. For example, timber production from an area is irretrievably lost during the time an area is allocated to a no-harvest prescription; if the allocation is changed to allow timber harvest, timber production can be resumed. The production lost is irretrievable, but not irreversible.

Irreversible Commitments
Decisions causing changes that cannot be reversed. For example, if a roadless area is allocated to allow timber harvest, and timber is actually harvested, that area cannot at a later time be allocated to wilderness. Once harvested, the ability of the area to meet wilderness criteria has been irreversibly lost. Often applies to nonrenewable resources such as minerals and cultural resources.

Issue
A point, matter, or section of public discussion or interest to be addressed or decided.

Karst
A type of typography that develops in areas underlain by soluble rocks, primarily limestones. Areas on which karst has developed is said to display "karst topography" or is referred to as a "karst landscape." Caves are commonly found in karst areas.

Knutsen-Vandenburg Fund (KV)
The portion of timber sale receipts collected and used for reforestation and other renewable resource projects on the sale area.

Land Use Designation (LUD)
The method of classifying land uses presented in the 1979 Tongass Land Management Plan (TLMP). Land uses and activities are grouped to define, along with a set of coordinating policies, a compatible combination of management activities. These LUD's have been replaced in the TLMP Revision DEIS by Management Prescriptions. The following is a description of the four LUD classifications:
LUD I: Wilderness areas. Undeveloped areas managed for solitude and primitive types of recreation, and containing unlatered habitats for plant and animal species.

LUD II: Lands to be managed in a roadless state in order to retain their wildland character; permits wildlife and fish habitat improvement as well as primitive recreation facilities and road development under special authorization.
LUD III: Lands to be managed for a variety of uses. The emphasis is on managing for uses and activities in a compatible and complimentary manner to provide the greatest combination of benefits.
LUD IV: Lands that provide opportunities for intensive resource use and development, where the emphasis is primarily on commodity or market resources.

Large Woody Debris (LWD)
Any large piece of relatively stable woody material having a diameter of at least 10 centimeters and a length greater than one meter that intrudes into the stream channel. Also called Large Organic Debris (LOD).

Layout
Planning and mapping (using aerial photos) of harvest and road systems needed for total harvest of a given area.

Limiting Factor
The environmental influence by which the limit of tolerance of an organism is first reached, and which acts as the immediate restriction to one or more of the organism's functions or activities or in its geographic distribution.

Log Transfer Facility (LTF)
A facility that is used for transferring commercially harvested logs to and from a vessel or log raft, or the formation of a log raft. It is wholly or partially constructed in waters of the United States; siting and construction are regulated by the 1987 Amendments to the Clean Water Act. Formerly termed "terminal transfer facility."

Logging Systems
Highlead. A cable yarding system, using a two-drum yarder, in which lead blocks are hung on a spar or tower to provide lift to the front end of the logs.
Aerial Logging Systems. Systems where the cut logs are moved from the stump to the loading area or log deck without touching the ground.
Live skyline/gravity carriage return. A two-drum, live skyline yarding system in which the carriage moves down the skyline by gravity; thus, is restricted to uphill yarding; the skyline is lowered to attach logs then raised and pulled to the landing by the mainline.
Live skyline/haulback required. A live skyline yarding system composed of skyline, mainline, and haulback; the carriage is pulled to the woods by the haulback; the skyline is lowered to permit the chokers to be attached to the carriage, and the turn is brought to the landing by the mainline.
Running skyline. A yarding system with three suspended moving lines, generally referred to as the main, haulback, and slack-pulling, that when properly tensioned will provide lift, travel and control to the carriage.; normally indicates a gantry type tower and a three-drum yarder.
Standing skyline. Used wherever yarding distances or span distances exceed the capability of live skyline equipment
Multispan skyline. European equipment is commonly associated with this.
Tractor. Used to describe the full range of surface skidding equipment, designed to operate on level to downhill settings
Shovel. A system of short-distance logging in which logs are moved from the stump to the landing by repeated swinging with a swing-boom log loader; the loader is walked off the haul road and out into the harvest unit; logs are moved and decked

progressively closer to the haul road with each pass of the loader; when logs are finallydecked at roadside, the same loader, or a different loader, loads out trucks.
On gentle ground, logs are either heeled and swung or dragged by the boom as it rotates; larger log length and tree length logs are usually dragged to maintain machine stability. Soils should be moderate to well drained and side slopes must be less than 20 percent; passes or stripes should be kept to a maximum of four.
Helicopter. Flight path cannot exceed 40 percent downhill or 30 percent uphill; landings must be selected so there is adequate room for the operation and so that the helicopter can make an upwind approach to the drop zone.
A-Frame. Beach fringe timber which is logged with a float mounted yarder typically rigged in a highlead configuration for direct A-frame yarding.
Cold-deck and swing. Planned to access areas not suitable for skyline operations.

MBF
A thousand board feet.

MMBF
A million board feet.

Management Area
An area one or more VCU's in size for which management direction was written in the Tongass Land Management Plan.

Management Indicator Species (MIS)
Species of vertebrates and invertebrates whose population changes are believed to best indicate the effects of land management activities. The following categories were used where appropriate: endangered and threatened plant and animal species identified on State and Federal lists; species with special habitat needs that may be influenced significantly by planned management programs; species commonly hunted, fished, or trapped; non-game species of special interest; additional plant or animal selected because their population changes are believed to indicate effects of management activities on other species of a major biological community or on water quality.

Management Prescriptions
Method of classifying land uses presented in the Tongass Land Management Plan (TLMP) Revision Draft EIS. Replaces the Land Use Designations (LUD's) originally presented in TLMP.

Marginal
Commercial forest land (CFL) areas that do not qualify as standard or special CFL since they are not operable under short-term (ten years or less) projections of accessiblity and economic conditions.

Mass Failure
The downslope movement of a block or mass of soil. This usually occurs under conditions of high-soil moisture and does not include individual soil particles displaced as surface erosion.

Mass Wasting
A general term for a variety of processes by which large masses of earth material are moved by gravity either slowly or quickly from one place to another. Also known as mass movement.

McGilvery
Soil type which represents the only well drained organic soil found in the Ketchikan Area. It is composed of a thin layer (less than 8 inches deep) of organic duff overlying bedrock or boulders, generally occupying the upper backslopes of hills and mountains. These soils are associated with cliffs and rock outcrops, and are sensitive to disturbance.

Middleground
The visible terrain beyond the foreground where individual trees are still visible but do not stand out distinctly from the landscape; area located 1/4 to 5 miles from the viewer. See also, Foreground and Background.

Mid-Market Analysis
An economic estimate of timber value at a point in time when half of the timber was harvested at a higher value and half was harvested at a lower value.

Mineral Soils
Soils consisting predominantly of, and having its properties determined by, mineral matter.

Mitigation
Measures designed to counteract environmental impacts or to make impacts less severe. These may include: avoiding an impact by not taking a certain action or part of an action; minimizing an impact by limiting the degree or magnitude of an action and its implementation; rectifying the impact by repairing, rehabilitating, or restoring the affected environment; reducing or eliminating the impact over time by preservation and maintenance operations during the life of the action; or compensating for the impact by replacing or providing substitute resources or environments.

Model
A representation of reality used to describe, analyze, or understand a particular concept. A model may be a relatively simple qualitative description of a system or organization, or a highly abstract set of mathematical equations. A model has limits to its effectiveness, and is used as one of several tools to analyze a problem.

Monitoring
A process of collecting information to evaluate whether or not objectives of a project and its mitigation plan are being realized. Monitoring can occur at different levels: to confirm whether mitigation measures were carried out in the manner called for, to determine whether the mitigation measures were effective, or to validate whether overall goals and objectives were appropriate. Different levels call for different methods of monitoring.

Multi-Entry Layout Plan (MELP)
Interdisciplinary design and mapping of all potential timber harvest units, including associated logging and transportation systems, within a Project Area.

Muskeg
In Southeast Alaska, a type of bog or fen that has developed over thousands of years in depressions or flat areas on gentle to steep slopes. Also called peatlands.

Mychorrizae
The unique relationship between certain fungi and the roots of certain plants, particularly trees; important for plants to take nutrients from soil.

Natal stream
Home stream, where an anadromous fish is hatched.

National Environmental Policy Act (NEPA) of 1969
An Act to declare a national policy which will encourage productive and enjoyable harmony between humankind and the environment, to promote efforts which will prevent or eliminate damage to the environment and biosphere and stimulate the health and wlefare of humanity, to enrich the understanding of the ecological systems and natural resources important to the Nation, and to establish a Council on Environmental Quality (The Pincipal Laws Relating to Forest Service Activites, agric. Handb. 453. USDA Forest Service, 359 p.).

National Forest Management Act (NFMA)
A law passed in 1976 as an amendment to the Forest and Rangeland Renewable Resources Planning Act requiring the preparation of Regional Guides and Forest Plans and the preparation of regulations to guide that development.

Native Allotment
A tract of non-mineral land, not to exceed 160 acres, on which an Alaska Native (who was 21 years of age or head of a household) established continuous use and occupancy prior to the creation of the National Forests (authorized under the Native Allotment Act of May 17, 1906).

Native Selection
Application by Native corporations and individuals to a portion of the USDI Bureau of Land Management for conveyance of lands withdrawn in fullfillment of Native entitlements established under ANCSA.

No-action Alternative
The most likely condition expected to exist in the future if current management direction were to continue unchanged.

Non-commercial Forest Land
Land with more than 10 percent cover of commercial tree species but not qualifying as Commercial Forest Land.

Notice of Intent (NOI)
A notice printed in the Federal Register announcing that an Environmental Impact Statement will be prepared. The NOI must describe the proposed action and possible alternatives, describe the agency's proposed scoping process, and provide a contact person for further information.

Offering
A Forest Service specification of timber harvest units, subdivisions, roads, and other facilities and operations to meet the requirements of a contract.

Offering Area
A geographic area identified by the Forest Service within which the offering specifications are outlined. One or more offering areas may be identified within all or a portion of a Project Area.

Old-growth Forest
A forest stand characterized by trees usually well past the age of maturity, with declining growth rates and signs of decadence such as dead and dying trees, snags, and

downed woody material. The stand usually includes large diameter trees, multi-layered canopies, a range of tree diameter sizes, and the notable presence of understory vegetation. Old-growth forests provide important habitat for Sitka black-tailed deer, marten, black bears, cavity nesting birds, raptors, and other wildlife species.

Organic Soils
Soils that contain a high percentage (greater than 15%) of organic matter throughout the soil depth.

Overmature
The stage at which a tree declines in vigor and soundness, for example, past the period of rapid height growth.

Overstory
The portion of trees in a forest which forms the uppermost layer of foliage. In a stand with several vegetative layers, the overstory is the uppermost layer usually formed by the tallest trees. Also called the canopy. See also, understory.

Parent Material
The unconsolidated and partly weathered rock fragments (or the C Horizon) from which upper layers of soil were derived.

Partial Cut
Method of harvesting trees where any number of live stems are left standing in any of vaious spatial patterns. Not clearcutting. Can include seed tree, shelterwood, or other methods.

Peak Flow
The highest discharge of water recorded over a specified period of time at a given stream location.

Pedogenic
The origin, character and utilization of soils.

pH
The degree of soil acidity or alkalinity.

Phloem
The tissue in plants that conducts foods such as sugar.

Planning Record
A detailed, formal account of the planning process for an EIS. The record contains data, maps, reports, planning process information, and results of public participation in the planning process. The planning record documents the decisions and activities that resulted in the Final EIS. Planning records are available for public review upon request under the Freedom of Information Act.

Pond Values
The delivered price of logs at the mill minus the cost to manufacture them into useable products.

Present Net Value
The difference between benefits and costs associated with the alternatives.

Precommercial Thinning
Removing trees that are too small to make a merchantable product to improve tree spacing and promote more rapid growth. See also, commercial thinning.

Receipts
Those priced benefits for which money will actually be paid to the Forest Service: recreation fees, timber harvest, mineral leases, and special use fees.

Record of Decision (ROD)
A document separate from but associated with an Environmental Impact Statement which states the decision, identifies all alternatives, specifying which were environmentally preferable, and states whether all practicable means to avoid environmental harm from the alternative have been adopted, and if not, why not.

Recreation Opportunity Spectrum (ROS)
Land delineations that identify a variety of recreation experience opportunities categorized into six classes on a continuum from primitive to urban. Each class is defined in terms of the degree to which it satisfies certain recreation experience needs based on the extent to which the natural environment has been modified, the type of facilities provided, the degree of outdoor skills needed to enjoy the area, and the relative density of recreation use. Categories include: Primitive I, Primitive II, Semi-primitive Nonmotorized, Semi-primitive Motorized, Roaded Natural, Roaded Modified, Rural,and Urban.

Reforestation
The natural or artificial restocking of an area with trees.

Regeneration
The process of establishing a new crop of trees on previously harvested land.

Region
An area covered by a Forest Service regional guide. A region is generally composed of one or more national forests. Forest Service Region 10 includes the Tongass National Forest and the Chugach National Forest.

Regional Forester
The Forest Service official responsible for administering a single region.

Regional Guide
The guide developed to meet the requirements of the Forest and Rangeland Renewable Resources Planning Act of 1974 as amended. It guides all natural resource management activities and establishes management standards and guidelines for the National Forest System lands within a given region.

Resident Fish
Fish that are not anadromous and that reside in fresh water on a permanent basis. Resident fish include non-anadromous dolly varden char and cutthroat trout.

Research Natural Area (RNA)
An area set aside by a public or private agency specifically to preserve a representative sample of an ecological community primarily for scientific and educationsl purposes. In USDA Forest Service usage, research natural areas are areas designated to ensure representative samples of as many of the major naturally occurring plant communities as possible.

Reserved
Lands that have been withdrawn from the timber base by an Act of Congress, the Secretary of Agriculture, or the Chief of the Forest Service.

Riparian Area
Geographically delineable area with distinctive resource values and characteristics that contain elements of aquatic and riparian ecosystems.

Riparian Ecosystem
Transition zone between a stream or lake system and the adjacent land. Identified in part by soil characteristics or distinctive plant communities that require free or unbound water.

Roads
Arterial. Roads usually developed and operated for long-term land and resource management purposes to constant service.
Collector. Collects traffic from Forest local roads; usually connects to a Forest arterial or public highway.
Local. Provides access for a specific resource use activity such as a timber sale or recreational site, although other minor uses may be served.
Preplanned. Roads planned in a prior EIS.
Temporary. For National Forest timber sales, temporary roads are constructed to harvest timber on a one-time basis. These logging raods are not considered part of the permanent Forest transportation network and have stream crossing structures removed, erosion measures put into place, and the road closed to vehicular traffic after harvest is completed.

Roadless Area
An area of undeveloped public land identified in the roadless area inventory of the TLMP Draft Revision within which there are no improved roads maintained for travel by means of motorized vehicles intended for highway use.

Rotation
The planned number of years (approximately 100 years in Alaska) between the time that a Forest stand is regenerated and its next cutting at a specified stage of maturity.

Salmonid
Refers to the group of fishes to which salmon belong.

Salvage Sale
A timber sale to use dead and downed timber and scattered poor-risk trees that would not be marketable if left in the stand until the next scheduled harvest.

Sawlog
That portion of a tree that is suitable in size and quality for the production of dimension lumber, collectively known as sawtimber.

Scheduled Timber Harvests
Timber harvests done as part of meeting the allowable sale quantity.

Scoping Process
Early and open activities used to determine the scope and significance of a proposed action, what level of analysis is required, what data is needed, and what level of public participation is appropriate. Scoping focuses on the issues surrounding the proposed

action, and the range of actions, alternatives, and impacts to be considered in an EA or an EIS.

Second Growth
Forest growth that has become established following some disturbance such as cutting, serious fire, or inset attack; even-aged stands that will grow back on a site after removal of the previous timber stand.

Sediment
Solid materials, both mineral and organic, in suspension or transported by water, gravity, ice, or air. May be moved and deposited away from their original location.

Selection Cutting
The annual or periodic removal or trees (particularly mature trees), individually or in small groups from an uneven-aged Forest to realize the yield and establish a new crop of irregular constitution.

Sensitivity Level
The measure of peoples' concern for the scenic quality of the national forests. In 1980, the Tongass National Forest assigned sensitivity levels to land areas viewed from boat routes, anchorages, plane routes, roads, trails, public-use areas, and recreation cabins.
Level I: Includes all seen areas from primary travel routes, use areas, and water bodies where at least three-fourths of the Forest visitors have a major concern for scenic quality.
Level II: Includes all seen areas from primary travel routes, use areas, and water bodies where at least one-fourth of the Forest visitors have a major concern for scenic quality.
Level III: Includes all seen areas form secondary travel routes, use areas, and water bodies where less than one-fourth of the Forest visitors have a major concern for scenic quality.

Sensitive Species
Plant and animal species which are susceptible or vulnerable to activity impacts or habitat alterations. Those species that have appeared in the Federal Register as proposed for classification or are under consideration for official listing as endangered or threatened species, that are on a non-official State list, or that are recognized by the regional forester as needing special management on national forest lands to prevent placement on Federal or state lists.

Seral
Early stage of succession.

Shelterwood Cutting
A harvest method in which most of the trees are removed in an initial entry and some trees are left to naturally reseed the area and provide protection to new seedlings that establish on the site. A second entry is conducted later to remove the remaining trees.

Significant
Specific legal term under the National Environmental Policy Act, which requires considerations of both context and intensity in evaluating impacts.

Silviculture
The science of controlling the establishment, composition, and growth of forests.

Sinkhole
See doline.

Site Preparation
Manipulation of the vegetation or soil of an area prior to planting or seeding. The manipulation follows harvest, wildfire, or construction in order to encourage the growth of favored species. Site preparation may include the application of herbicides burning, or cutting of living vegetation that competes with the favored species; tilling the soil; or burning of organic debris (usually logging slash) that makes planting or seeding difficult.

Slash
The debris left on the ground after logging, pruning, or brushcutting or as a result of storm, fire, girdling, or poisoning. It includes logs, uprooted stumps, bark, and branches.

Slip plane
Closely spaced surfaces along which differential movement takes place in rock. Analagous to surfaces between playing cards.

Smolt
Young salmon or trout which move from freshwater streams to saltwater.

Snag
A standing dead tree, usually greater than 5 feet tall and 6 inches in diameter at breast height.

Soil Productivity
Capacity of a soil to produce plant growth, due to the soil's chemical, physical, and biological properties.

Soil Texture
Relative amounts of sand, silt, and clay in a soil. Coarse-textured soils are generally considered sandy and often contain gravel of various sizes. Fine-textured soils are considered very fine, sandy, silty, or clayey.

Solum
The upper and most weathered part of the soil profile; the A and B horizons.

Specified Road
Road built for long-term management of the forest as part of a timber sale contract.

Stand (Tree Stand)
A group of trees occupying a specific area and sufficiently uniform in composition, age arrangement, and condition as to be distinguishable from the forest in adjoining areas.

Standard
A course of action or level of attainment required by the Forest Plan to promote achievement of goals and objectives.

State Historic Preservation Officer (SHPO)
State appointed official who administers Federal and State programs for cultural resources.

State Selection
Application by Alaska Dept. of Natural Resources to the USDI Bureau of Land Management for conveyance of a portion of the 400,000-acre State entitlement from vacant and unappropriated National Forest System lands in Alaska, under the Alaska Statehood Act.

Stocking
The basal area or number of trees required to fully use the growth potential of the land.

Stream Classes
See Aquatic Habitat Management Unit.

Structural Diversity
The diversity of forest structure, both vertically and horizontally, which provides for a variety of forest habitats such as logs and multi-layered forest canopy for plants and animals.

Stumpage
The value of timber as it stands uncut in terms of dollar value per thousand board feet.

Subsistence Use
The customary and traditional uses by rural Alaskan residents of wild renewable resources for direct personal or family consumptions as food, shelter, fuel, clothing, tools, or transportation; for the making and selling of handicraft articles out of non-edible byproducts of fish and wildlife resources taken for personal or family consumption; and for customary trade.

Subsistence Use Area
Important Subsistence Use Areas include the "most reliable" and "most often hunted" categories from the Tongass Resource Use Cooperative Survey (TRUCS) survey and from subsistence survey data from ADF&G, the University of Alaska, and the Forest Service, Region 10. Important use areas include both intensive and extensive use areas for subsistence harvest of deer, furbearers, and salmon.

Substantive Comment
A comment that provides factual information, professional opinion, or informed judgement germane to the action being proposed.

Succession
The ecological progression of community change over time, characterized by displacements of species leading towards a relatively stable climax community.

Suitable
Commercial Forest land identified as having both the biological capability and availability to produce industrial wood products.

Sustained Yield
The amount of renewable resources that can be produced continuously at a given intensity of management.

Temporary Road
See Roads.

Thinning
The practice of removing some of the trees in a stand so the remaining trees will grow faster due to reduced competition for nutrients, water, and sunlight. Thinning may also be done to change the characteristics of a stand for wildlife or other purposes. See also, commercial thinning, precommercial thinning.

Threatened Species
Plant or animal species likely to become endangered throughout all or a significant portion of their range within the foreseeable future, as defined in the Endangered Species Act of 1973, and which has been designated in the Federal Register by the Secretary of the Interior as a threatened species. (See also, endangered species, sensitive species.)

Tiering
Eliminating repetitive discussions of the same issue by incorporating by reference. The general discussion in an environmental impact statement of broader scope; e.g., this document is tiered to the Tongass Land Management Plan, as amended.

Till
An unstratified deposit of gravel, boulders, sand, and finer materials which has been transported and deposited by a glacier.

Timber Appraisal
Establishing the fair market value of timber by taking the selling value minus manufacturing costs, the cost of getting logs from the stump to the manufacturer, and an allowance for profit and risk.

Timber Entry
A term used to refer to how far into the timber rotation an area is on the basis of acreage harvested. For example, if an area is being managed for three entries over a 100-year rotation, the first entry would be completed when one-third (approximately 33 percent) of the available acreage is harvested (usually in 30-40 years): the second entry would be completed when two-thirds (approximately 66 percent) of the available acreage is harvested (usually 60-70 years); the third entry would be completed when all of the available acreage is harvested (at the end of the rotation).

Timber Production
The purposeful growing, tending, harvesting ,and regeneration of regulated crops of trees to be cut into logs, bolts, or other round sections for industrial or consumer use.

Timber Sale Contract
In this document, refers to the Ketchikan Pulp Company Long-Term Sale Contract with the Forest Service.

Tongass Land Management Plan (TLMP)
The 10-year land allocation plan for the Tongass National Forest that directs and coordinates planning, the daily uses, and the activities carried out within the forest. Currently under revision.

Tongass Resource Use Cooperative Survey (TRUCS)
A study on subsistence uses which was used for evaluating the effects of the proposed action in this EIS.

Turbidity
An indicator of the amount of sediment suspended in water.

Understory
The trees and shrubs in a forest growing under the canopy or overstory.

Uneven-aged Management
Forest management techniques which simultaneously maintain continuous high-forest cover, recurring regeneration of desirable species, and the orderly growth and development of trees through a range of diameter or age classes. Cutting is usually regulated by specifying the number or proportion of trees of particular sizes to retain within each area, thereby maintaining a planned distribution of size classes.

Unsuitable
Forest land withdrawn from timber utilization by statute or administrative regulation; for example, wilderness, or identified as not appropriate for timber production in the forest planning process.

Utility Logs
Those logs that do not meet sawlog grade but are suitable for production of firm useable pulp chips.

Value Comparison Unit (VCU)
Areas which generally encompass a drainage basin containing one or more large stream systems; boundaries usually follow easily recognizable watershed divides. Established to provide a common set of areas where resource inventories could be conducted and resource interpretations made.

Viable Population
The number of individuals of a species required to ensure the continued long-term existence of the population in natural, self-sustaining populations, adequately distributed throughout their region.

Viewshed
An expansive landscape or panoramic vista seen from a road, marine waterway, or specific viewpoint.

Visual Quality Objectives (VQO's)
Measurable standards reflecting five different degrees of landscape alteration based upon a landscape's diversity of natural features and the public's concern for high scenic quality. The five categories of VQOs are:
Preservation: Permits ecological changes only. Applies to wilderness areas and other special classified areas. Management activities are generally not allowed in this setting.
Retention: Provides for management activities that are not visually evident to the casual Forest visitor.
Partial Retention: Management activities remain visually subordinate to the natural landscape.
Modification: Management activities may visually dominate the characteristics landscape. However, activities must borrow from naturally established form-line color and texture so that the visual characteristics resemble natural occurrences within the surrounding area when viewed in the middleground distance.
Maximum Modification: Management activities may dominate the landscape but should appear as a natural occurrence when viewed as background.

V-notch
A deeply cut valley along some waterways, generally in steep, mountainous terrain, that would look like a "V" from a frontal view.

Volume Class
Used to describe the average volume of timber per acre in thousands of board feet (MBF). The seven volume classes include:
Classes 1 to 3: Less than 8 MBF/acre (cleared land, seedlings, or pole timber stands).
Class 4: 8 to 20 MBF/acre.
Class 5: 20 to 30 MBF/acre.
Class 6: 30 to 50 MBF/acre.
Class 7: 50+ MBF/acre.

Watershed
The area that contributes water to a drainage or stream; portion of a forest in which all surface water drains to a common point. Can range from a few tens of acres that drain a single small intermittent stream to many thousands of acres for a stream that drains hundreds of connected intermittent and perennial streams.

Wetlands
Areas that are inundated by surface or groundwater frequently enough to support vegetation that requires saturated or seasonally saturated soil conditions for growth and reproduction. Wetlands generally include: swamps, marshes, bogs, and similar areas such as sloughs, potholes, wet meadows, river overflows, mudflats, and natural ponds.

Wild and Scenic Rivers
Rivers or sections of rivers designated by congressional actions under the 1968 Wild and Scenic Rivers Act, or by an act of the Legislature of the state or states through which they flow. May be classified or administered as Wild, Scenic, or Recreational.

Wilderness
Areas designated by congressional action under the 1964 Wilderness Act. Wilderness is defined as undeveloped federal land retaining its primeval character and influence without permanent improvements or humans habitation. Wildernesses are protected and managed to preseve their natural conditions, which generally appear to have been affected primarily by the forces of nature with the imprint of human activity substantially unnoticeable; have oustanding opportunities for solitude or a primitive and unconfined type of recreation; are of sufficient size to make practical their preservation, enjoyment, and use in an unimpaired condition; and may contain features of scientific, educational, scenic, or historical value as well as ecologic and geologic interest. In Alaska, wilderness has been designated by TTRA and ANILCA.

Wildlife Analysis Area (WAA)
A division of land designated by the Alaska Dept. of Fish and Game and used by the USDA Forest Service for wildlife analysis.

Wildlife Habitat
The locality where a species may be found and where the essentials for its development and sustained existence are obtained.

Wildlife Habitat Management Unit (WHMU)
An area of wildlife habitat identified during the IDT process as having values important to wildlife.

Windfirm
Configuration of harvest units so as not to create an opening which exposes the adjacent stand of timber to the direction of the major prevailing storm wind (southeast).

Windthrows
Areas where trees are uprooted, blown down, or broken off by storm winds.

Winter Range
An area, usually at lower elevation, used by big game during the winter months.

Withdrawal
The withholding of an area of Federal land from settlement, sale, location, or entry under some or all of the general land laws for the purpose of limiting activities under those laws in order to maintain other public values in the area.

Xylem
Woody tissue of plants that conducts water and substances in solution.

Yarding
Hauling timber from the stump to a collection point.

Yield Tables
Tables that estimate the level of outputs that would result from implementing a particular activity. Usually referred to in conjunction with FORPLAN input or output. Yield tables can be developed for timber volumes, range production, soil and water outputs, and other resources.

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Appendices

A. Reasons for Scheduling

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Appendix A

Reasons for Scheduling the Environmental Analysis of the Central Prince of Wales Project Area

Reasons For Scheduling The Environmental Analysis Of The Central Prince of Wales Project Area

KPC Long-term Timber Sale Contract Offerings

This appendix explains why the Central Prince of Wales Project Area is scheduled for environmental analysis at this time.

Summary

Reasons for scheduling the Central Prince of Wales Project Area at this time, for detailed consideration of timber harvest under the Ketchikan Pulp Company Long-term Timber Sale Contract, may be summarized as follows:

1. The Central Prince of Wales Project Area is within the designated primary sale area for the Ketchikan Pulp Company Long-term Timber Sale Contract, and contains a sufficient amount of harvestable timber volume designated as LUD III or IV, and therefore appropriate for harvest under the Tongass National Forest Land Management Plan (TLMP). Available information indicates harvest of the amount of timber being considered for this project can occur consistent with Forest Plan Standards and Guidelines and other requirements for resource protection. Consideration of areas outside the designated sale area at this time would not meet Ketchikan Pulp Company Contract requirements and is otherwise not necessary or reasonable.

2. Other areas with available timber inside the designated sale area will be necessary for harvest within the remainder of the Ketchikan Pulp Company Contract term (by 2004) in order to meet contract volume requirements. Effects on subsistence resources are projected to differ little according to which sequence these areas are subjected to harvest. Harvesting other areas on the Tongass National Forest with available timber is expected to have similar potential effects on resources, including those used for subsistence because of widespread distribution of subsistence use and other factors. Harvest of these other areas is foreseeable, in any case, over the forest planning horizon under either the existing or proposed revised Forest Plan.

3. Providing substantially less timber volume than required by the Ketchikan Pulp Company Contract in order to avoid harvest in the Central Prince of Wales Project Area or other project areas would not meet contract requirements and is otherwise not necessary or reasonable.

4. It is reasonable to schedule harvest in the Central Prince of Wales Project Area at present rather than other areas in terms of previous harvest entry and access, level of controversy over subsistence and other effects, and the ability to complete the National Environmental Policy Act (NEPA) process and make timber available to meet contract requirements by the time it is reasonably necessary to do so. Other areas that are reasonable to consider for harvest in the near future are the subject of other project EISs that are currently ongoing or scheduled to begin soon.

More detail regarding the scheduling of the environmental analysis for the Central Prince of Wales Project Area is presented in this appendix in three subsections:

Ketchikan Pulp Company Contract Requirements
Tongass Land Management Plan
Forest Plan Implementation

Ketchikan Pulp Company Contract Requirements

Contract Background

In 1951, the Forest Service and Ketchikan Pulp Company (APC) entered into a contract for sale and harvest of timber in Southeast Alaska for a 50-year period beginning in 1954 and ending in 2004. A primary function of this long-term contract was to "establish a new industrial enterprise which will be an important and significant step in the industrial development of Alaska" (Forest Service 1956).

The current management situation consists of a valid contract between the Forest Service and KPC, contract number A10fs-1042. This contract bestows rights and obligations on both parties. One obligation for the Forest Service is to provide the agreed upon volume from an identified contract sale area on the Tongass National Forest. Contract section B0.62 states in part "Forest Service shall seek to specifiy sufficient Offerings to maintain a Current Timber Supply in all Offering Areas that total at least three years of operations hereunder or until the contract termination date, whichever comes first, and which meets the the production requirements of Purchaser's manufacturing facilities." This three year supply equates to approximately 615 million board feet.

"Current Timber Supply" is defined in the contract generally as timber which the Forest Service has specified according to Forest Service planning procedures and for which the NEPA process has been completed. The Forest Service specifies timber through approving in writing a timber "Offering" under the contract, comparable to an independent timber sale. This approval in writing is represented by issuance of an "A Division" contract document for the Offering. An EIS such as the Central Prince of Wales Project Area EIS may cover one or up to several such Offerings, which may be specified by the Forest Service and therefore added to the contract "Current Timber Supply" concurrently or sequentially after issuance of the Record of Decision for the Project. Generally, layout on the ground of roads and harvest units selected in the Record of Decision (ROD) will be completed for each Offering prior to issuance of the "A Division" approval document.

The Forest Service Timber Sale Preparation Handbook (FSH 2409.18 Chapter 10) details the process utilized to prepare timber sales. This process also guides the preparation of timber Offerings under the KPC Contract. The timber sale preparation process is summarized below. Included in brackets is information describing modifications to the process specific to the KPC Contract. The Handbook states:

> The timber sale preparation process begins with the identification of the sale area and ends with the award of the timber sale contract [as described above, the process for the KPC Contract ends with the issuance of an "A Division" contract document for the Offering]. These activities pass through specific stages, called "gates", each of which requires specific outputs before proceeding to the next gate. . . Following are descriptions of work processes at each gate.

> Gate 1. Begin sale preparation activities with scoping or position statement development. Identify the purpose and need for the project, public issues, interested outside parties, management issues, resource opportunities in the sale area, a range of possible volume targets, and initial transportation system needs. . .
>
> Gate 2. During the sale area design (environmental analysis) phase, develop alternative designs and analyze them for environmental effects. Concurrently, develop an analysis file to store the information that is gathered. Once a course of action is selected, develop a sale implementation plan that provides detailed instructions for field layout of all sale elements. The end product of the sale area design phase is the selection of the preferred alternative and signature of the decision notice by the official authorized to approve the project. . .
>
> Gate 3. Activities leading to sale plan implementation include the data gathering and the on-the-ground marking, designating, and delineating needed to properly support the appraisal, the preparation of the contract, and post-award sale administration efforts. The sale passes through gate 3 when the field work is completed. . .
>
> Gate 4. After gathering all necessary engineering design work, cruise (volume) information, logging costs, environmental protection costs, and other elements of the timber appraisal. . . [a final timber appraisal is prepared for the offering(s) and an "A Division" contract document is issued].

Contract provisions require KPC to harvest timber, construct and operate a mill for primary manufacture and to recruit labor from residents of Southeast Alaska. To fulfill this obligation KPC operates a sawmill and a pulp mill in Ketchikan and a sawmill in Metlakatla.

Why Areas Outside The Primary Sale Area Boundary Are Not Considered In Detail

Since authorization of the KPC contract in 1951, several laws have changed the land base from which the authorized timber volume could be removed. The Alaska Native Claims Settlement Act (ANCSA) authorized substitution to replace areas selected by the Native Companys. The Alaska National Interest Lands Conservation Act (ANILCA) authorized substitution for areas designated by Congress as Wilderness in that statute which were in the primary sale area. The substitutions for Native selections and Wilderness selections were accomplished prior to the Central Prince of Wales Project Area environmental analysis process.

Section B0.3 of the contract, *Description of Timber*, states in part:

> The Ketchikan Pulp & Paper Company . . . ,hereby agrees to purchase from an area definitely designated on the attached maps which are part of this agreement, within pulptimber Allotments E, F, and G. . . The estimated amount to be cut under the methods of marking described in B2.3 is 1,500,000,000 cubic feet of western hemlock, Sitka spruce, western redcedar, Alaska cedar, and other species of timber, more or less.

Section B0.31 of the contract, *Additional Areas*, states in part:

> In the event the quantity of timber available for cutting within the above described area is insufficient for full scale operation until June 30, 2004 . . . the Regional

> Forester shall designate additional cutting areas within Pulptimber Allotments E, F, and G to meet such needs of such plants for the priod ending June 30, 2004, provided, that the Regional Forester is not obligated to make available for cutting more than the 1,500,000,000 cubic feet of material covered by this agreement. . .

Section B0.61 of the Contract, *Timber Offering Schedule*, provides in part:

> "To the extent authorized by law, Offering Areas may be identified for harvest outside the sale area, as needed to meet sale volume requirements."

The Central Prince of Wales Project Area lies within the "primary sale area" in Allotments E and G described in contract section B0.3. Current data indicates that there remains sufficient timber available within the designated sale area, including the additional areas described in Contract section B0.31 above, to provide the remaining unharvested portion of the total contract volume of 1,500,000,000 cubic feet, consistent with Forest Plan Standards and Guidelines and other requirements for environmental protection. The most recent Supplement to the Draft EIS for the Tongass Land Management Revision (TLMP SDEIS), which considers reductions in timber base due to the Tongass Timber Reform Act (TTRA), indicates this for the "current direction" alternative. For the current preferred alternative for the TLMP revision, the TLMP SDEIS indicates that there is at present easily enough available volume within the primary designated sale area to meet contract volume requirements for the next several years at least, while still meeting all constraints associated with the alternative. At some point in the future however, volume will also be required from the contingency areas to fulfill the contract volume requirments. This evaluation is incorporated by reference and further described in the last section in this Appendix, *Forest Plan Implementation*.

Therefore, providing volume outside of the primary sale area is not necessary at this time under the terms of the contract. Modifying the contract does not meet the purpose and need for the project. Although KPC has indicated that the Forest Service has the discretion to consider obtaining volume from outside the designated sale area, it has not expressed an interest obtaining timber from other areas in lieu of the Central Prince of Wales Project Area. The criteria for modification in 36 CFR 223.112,113 have not been met, considering the information in the TLMP SDEIS, and this EIS. Congress in enacting the Tongass Timber Reform Act declined to modify the contract sale area, and by directing in section 301(e) of the statute that the Secretary of Agriculture report to Congress on the effects of eliminating the sale area, indicated an intent to reserve this decision to the legislature.

Why Providing Less Than The Contract Volume Was Not Considered In Detail

Congress in section 301(e) of the TTRA also indicated its intent to reserve to itself the question of providing less than the contract volume obligation to KPC. Providing less than the contract volume would not meet the purpose and need for the Central Prince of Wales Project. The Forest Service can expect a large monetary claim from KPC for not meeting contract volume obligations, for which there is no current funding. To the contrary, recent federal appropriations legislation has dedicated additional money to providing additional timber offerings to KPC and other Tongass National Forest timber purchasers. Volume from independent timber sales or sources outside the Tongass National Forest do not fulfill KPC Contract requirements. In any case, there is not sufficient projected volume from other sources to meet KPC volume requirements.

Logs from Native Company lands cannot substantially meet the total needs of KPC. Owners of private timberland are able to sell their sawlogs on the export market for much higher prices than can be paid by local manufacturing. KPC is not prohibited under the Contract

from purchasing timber from Native Companys or other sources, subject to the requirement that, ". . . at least three-fourths of the pulpwood requirements of the pulp manufacturing plant and other processing facilities operated in conjunction with this sale shall be cut from the areas covered by this agreement during the period prior to July 1, 1964, and during each 5-year operating period sebsequent to that date. " (KPC contract B0.53). There are no provisions in the Contract to offset such purchases by adjusting the Contract timber volume. Harvest from Native Company lands is decreasing, reducing potential pulp as well as sawlog availability from these lands (TLMP SDEIS page 3-339).

Canadian timber has been mentioned in the past as a source of supply for Southeast mills. Southeast Alaska pulp mills have purchased pulp logs from British Columbia (BC) in the past. However, the political and economic situation in British Columbia has changed to decrease the likelihood of substantial supply from this source. The June 1988 issue of British Columbia Lumberman, page W14, states that a substantial increase in demand for BC forest products is expected to decrease log exports. The Forest Minister stated: "Our main objective is to use BC timber to manufacture wood products in this province." It has been more recently stated that British Columbia is considering prohibiting log exports and is facing increased environmental pressures (TLMP SDEIS, page 3-339).

Trying to meet the long-term volume contractual obligations from outside the long-term timber sale boundaries would decrease the availability of timber for the independent timber sale program, including the Small Business Set Aside Program; obtaining a substantial portion of long-term contract timber from outside the designated sale areas would probably decrease the independent sale program by an equivalent amount under the current TLMP allowable sale quantity. Under the current Plan, an annual average of 271 MMBF net sawlog of the ASQ is needed to meet the long-term sale requirements, leaving an annual average of 179 MMBF net sawlog for the independent program.

The TLMP SDEIS (table 3-134, page 3-368) shows for the current Plan as amended by the TTRA (Alternative C) the contribution to ASQ net sawlog (MMBF) by Allotment Area. Contingency Areas of Allotment E, F, and G of the KPC contract area contribute 125 MMBF annual average (28%) to the ASQ. Designating any part of this volume for the long-term sale would directly reduce the portion of the ASQ available for the independent program. The timber volume included in the action alternatives in the Central Prince of Wales Project Area EIS and scheduled from this area in the TLMP for the long-term contract is greater than the current yearly size of the entire Small Business Administration timber sale program agreed to with the SBA, 80 MMBF. Section 105 of the Tongass Timber Reform Act reflects Congressional intent that the SBA program continue.

Lack of an adequate timber supply to support these programs could affect the existing mill infrastructures and employment. The TLMP SDEIS (table 3-118, page 3-337) shows that lumber mill capacity for independent operators is about 220 MMBF annually (380 MMBF minus the Wrangell and KPC Sawmills). During good market conditions, the short term sales program has purchased up to 174 MMBF and harvested up to 149 MMBF annually which translates into about 67 percent of the mill capacity (TLMP SDEIS, table 3-114, page 3-325). Therefore, under good market conditions, the existing infrastructure can absorb the available supply. Elimination of short term sales under the independent and set-aside programs would translate into a loss of between 815 and 1144 timber-related jobs (TLMP SDEIS page 3-370, 3-610).

Current Timber Supply And Contract Volume Needs

This section provides an updated look at the long-term contract timber volume projected to be available to KPC. It includes a tentative schedule projecting how volume is to be

made available to meet contract obligations which states; "Forest Service shall seek to to specify sufficient Offerings to maintain a Current Timber Supply in all Offering Areas that totals at least three years of operations hereunder or until contract termination date, whichever comes first, and which meets the production requirements of the Purchaser's manufacturing facilities." (Contract Section B0.62).

Generally, there is a need for approximately 2,500 million board feet of timber volume remaining over the life of the KPC contract. This equates to an average of approximately 205 million board feet per year.. Table 1 shows the volume available as of January 1, 1992 and displays how timber volume would be scheduled through 1996 to help meet current timber supply needs.

Table 1
Current Timber Supply and Projected Harvest to 1996.[1]

Project Area and Offerings	1992 Timber Supply	1993 Harv.	1993 Timber Supply						
1989-94	120	120	0						
CPOW (290)		85	205						
LAB Bay (85)			85						
Polk Inlet (125)			125						
North Revilla (200)			200						
Total Volume	**120**	**205**	**615**						

Numbers shown in parentheses indicate EISs in progress.
[1] All volume figures shown include sawlog and utility volume and are in MMBF.

The Central Prince of Wales Project Area EIS offers volume to help meet KPC contract obligations starting in 1993. This amount of volume is reasonably necessary to help maintain a three year Current Timber Supply of at least 615 million board feet of timber. Based on the scenario shown in table 1, operations in Central Prince of Wales Project Area could begin in 1993 with all operations substantially complete by 1996.

Tongass Land Management Plan

TLMP As Amended Winter 1985-86

Chapter 1 of this EIS includes an explanation of how this project relates to the Tongass Land Management Plan. That section describes the Land Use Designations (LUDs) which allocate land areas to different types of management. Chapter 1 also explains that these LUDs were assigned to land areas known as Value Comparison Units (VCUs), and that one or more contiguous VCUs were formed into Management Areas (MAs). This section also describes the management emphasis for the Management Areas likely to be affected by the Central Prince of Wales Project.

The Tongass Land Management Plan, As Amended Winter 1985-1986, not only detailed Management Direction/Emphasis for each Management Area, it also scheduled specific

Management Activities for specific time periods. In particular it scheduled timber sale preparation activities for 1985-89 and 1990-94. Table 2 displays the Management Areas scheduled for timber sale preparation during 1990-94.

Table 2
TLMP, As Amended Winter 1985-86, Activity Schedule

Management Area	Name	Years Scheduled	Activity Scheduled
K03	El Cap/Whale Pass	90-94	Timber Sale Prep
K07	Tuxekan Narrows	90-94	Timber Sale Prep
K08	Honker/Sweetwater	90-94	Timber Sale Prep
K09	Clarence Strait	90-94	Timber Sale Prep
K10	Thorne Bay	90-94	Timber Sale Prep

The Allowable Sale Quantity (ASQ), calculated in TLMP and used in Congressional deliberations and decisions on ANILCA, assumed harvest in all LUD III and LUD IV VCUs, in compliance with the Southeast Area Guide, on a three entry, 100 year rotation. Some selected areas were scheduled for 4 entries in 120 years (LUD IV) and 6 entries in 200 years (LUD III) for visual considerations. A three entry rotation assumes the first entry will be made within 30 to 40 years. If areas are not entered, and the ASQ is harvested, other areas will have to receive a heavier entry, resulting in a pattern of high percentage first entries being established, and therefore creating conditions under which the three-entry rotation may not be achievable.

The TLMP as amended also scheduled as anticipated management outputs from the Ketchikan Area timber volume ranging from 195.0 million to 220.3 million annually (Tongass Land Management Plan Amended Winter 1985-86, page 5).

Supplemental TLMP Revision Draft EIS (TLMP SDEIS)

1. Sufficient Volume for KPC Contract Needs in TLMP SDEIS.

The TLMP SDEIS Chapter 3 section on timber (pages 3-354 and 355) provides the following summary statements in terms of the timber supply and the long-term timber sale programs.

> If utility volume is included, Alternatives B, C, D, and P would meet or exceed the projected demand for National Forest timber (400 MMBF). Alternative A would provide 89 percent of the projected demand.
>
> All of the first-decade Allowable Sale Quantity (ASQ, sawlog) in Alternative A would be needed to satisfy the long-term contracts; Alternative B would need 82 percent of the ASQ; Alternative C, 69 percent; Alternative D, 66 percent; and Alternative P, 75 percent.

These statements show that timber supply exceeds the level which is required to satisfy the long-term timber sale contracts (both APC and KPC). The data to support these statements is displayed in table 3-127 on page 3-355 and table 3-135 on page 3-371 of

TLMP SDEIS. Table 3-135, in particular, shows the Long-Term and Short-Term Sales program volumes for the decade.

TLMP SDEIS also presents a discussion of timber supply within the KPC long-term contract sale area. As of October 1990 (the date of the TLMP SDEIS analysis), the remaining KPC Long-term Timber Sale Contract volume requirement was 2,443 MMBF, including utility (TLMP SDEIS , table 3-116, page 3-329, table 3-133, page 3-366). TLMP SDEIS alternatives A, B, C, D, and P provide, respectively, 3,800 MMBF, 4,180 MMBF, 5,930 MMBF, 5,920 MMBF and 5,480 MMBF, including utility, from the KPC designated sale area (allotments E, F, and G (TLMP SDEIS, table 3-133, page 3-366). So the all alternatives in the TLMP SDEIS indicates more than sufficient timber remaining available in the designated KPC sale area to meet remaining contract volume requirements, consistent with resource protection requirements and other constraints projected in the document.

Further analysis in TLMP SDEIS is related to suitable-available acres. These are acres of forest that are identified as suitable for timber harvest and which are assigned management prescriptions within the TLMP SDEIS that allow consideration of timber harvest. For each alternative, TLMP SDEIS analysis confirms that the identified suitable-available acres contain more than enough potentially available timber within the sale area to meet the remaining volume commitment. These figures appear in table 3-134, pages 3-368 and 3-369, TLMP SDEIS and are summarized in the following table.

Table 3
Timber Volume Available Within The Contract Area

Alt.	Allotment Area	Suitable-Available (Acres)	Old Growth Standing Vol (MMBF)
A	E-Primary	141,194	2,098
	F-Primary	38,960	698
	G-Primary	101,493	1,499
	Rest of E	39,166	826
	Rest of F	129,743	2,891
	Rest of G	157,426	2,806
		-----------	--------
		607,982	10,818
B	E-Primary	154,484	2,408
	F-Primary	42,193	793
	G-Primary	122,586	1,868
	Rest of E	45,926	984
	Rest of F	147,347	3,291
	Rest of G	153,245	2,678
		-----------	--------
		665,781	12,022
C	E-Primary	169,584	2,772
	F-Primary	47,769	915
	G-Primary	139,423	2,223
	Rest of E	75,551	1,702
	Rest of F	234,232	5,367
	Rest of G	227,707	4,407
		-----------	--------
		894,266	17,386
D	E-Primary	179,257	2,931
	F-Primary	49,889	939
	G-Primary	145,925	2,356
	Rest of E	47,065	1,010
	Rest of F	213,401	4,853
	Rest of G	240,790	4,676
		-----------	--------
		876,327	16,765
P	E-Primary	161,578	2,586
	F-Primary	45,262	859
	G-Primary	135,737	1,401
	Rest of E	65,954	1,462
	Rest of F	217,768	4,981
	Rest of G	199,856	3,809
		-----------	--------
		826,155	15,098

Furthermore, TLMP SDEIS displays the number of acres of tentatively suitable lands that are scheduled to be harvested over the planning horizon for each Management Area (TLMP SDEIS, table 3-138, page 3-378). This table indicates that the scheduling of the Central Prince of Wales Project Area and other project areas within the KPC sale area to meet contract volume requirements over the next several years is anticipated. In addition, this table shows that there are adequate suitable acres in these Management Areas, scheduled to be harvested, to provide that volume. A portion of table 3-138 is displayed below in table 4. It displays, for Alternative P, the scheduled suitable acres by Management Area. Table 4 is similar to table 2 which showed the Management Areas scheduled for timber sale preparation during 1991-95. A comparison of these two tables indicates that the Management Areas identified as appropriate for timber harvest activities in the existing TLMP (as amended winter 1985-86) are also identified as appropriate in alternative P of TLMP SDEIS.

Table 4
TLMP SDEIS Alternative P Scheduled Acres (selected Management Areas)

Mgmt. Area	Name	Acres Sched-uled	Percent Of MA	Total MA Acres
K03	El Capitan	50,923	46.8	108,805
K07	Tuxekan	74,553	63.0	118,310
K08	Honker	57,310	46.3	123,835
K09	Clarence	52,296	55.0	95,068
K10	Thorne Bay	19,694	40.9	48,194

2. Cumulative Effects

The TLMP SDEIS considers the cumulative effects for forest-wide acres managed for timber production for both the long-term and short-term timber sale programs. These effects are discussed on pages 3-371 through 3-381. Cumulative effects for other resources are discussed at the end of their respective sections.

Analysis points to the need to schedule harvest in VCUs assigned management prescriptions which permit consideration of timber harvest, including the VCUs within the Central Prince of Wales Project Area. These VCUs in the current Forest plan, and in the draft revised Forest Plan would be needed to help meet the Tongass National Forest Allowable Sale Quantity, and also the contractual timber volume needs for the KPC Long-term Timber Sale. The forest-wide cumulative effects analysis in the TLMP SDEIS supports the conclusion that this harvest can be accomplished within existing and proposed revised TLMP standards and guidelines and other requirements for resource protection.

3. Subsistence

With the passage of the ANILCA, Congress recognized the importance of subsistence resources to rural residents of Alaska. In particular, prior to any disposition of public lands,

an agency must first complete a subsistence effects evaluation, including consideration of the availability of other lands (ANILCA 810 (a)).

Based on a review of available harvest volumes for each VCU in the KPC contract area, it appeared that in order to meet contract volume commitments, most of the LUD III and IV VCUs would need some level of harvest prior to the end of the KPC contract in 2004. A tentative offering schedule was developed and approved for implementation based on this analysis. In short, almost all LUD III and IV VCUs in the KPC Long-term Sale would be scheduled for harvest within the next 10 to 15 years, indicating a level of impact to all subsistence use areas. However, the most significant impacts on the subsistence resource habitat would not occur until 20 to 30 years after the timber harvest when the second growth canopy closes. When those impacts to subsistence resources are viewed from a reference point 20 years in the future, the particular importance of which areas are scheduled first during a 5-year period appears to be minor.

In considering communities that may be most affected by any proposed timber harvest in the Central Prince of Wales Project Area, Coffman Cove, Craig, Hollis, Hydaburg, Kasaan, Klawock, Petersburg, Point Baker, Port Protection, Thorne Bay, Whale Pass, and Wrangell appear to have the strongest cultural and subsistence ties to the area. Each community has its own level of reliance on subsistence as well as its own level of reliance on the Central Prince of Wales Project Area for supplying subsistence resources. The following information about each communities subsistence use is a summary of more detailed information provided in chapters 3 and 4 of the Central Prince of Wales Project EIS.

Coffman Cove The alpine areas to the south are used for early season deer hunting. Fishing occurs in Eagle Creek and Hatchery Creek. The tidal flats extending east from Coffman Cove to Lake Bay and Barnes Lake are popular areas for waterfowl and bear hunting. Some trapping occurs along the shoreline of Sweetwater Lake, while the lower reaches of Logjam Creek and Sweetwater Lake are used for fishing. Eighty-one percent of Coffman Cove's deer came from the Project Area WAA's between 1987 and 1990. Analysis shows that there is an adequate number of deer to meet the current subsistence demand for deer now and through the year 2040, (Alternative P TLMP SDEIS); however, at some point in the future it may be necessary to restrict the sport harvest of deer and give the rural communities preference.

Craig Areas adjacent to the road system---Thorne River, Hatchery Creek, Logjam creek, Staney Creek and Sarkar Lake---are some of the major subsistence use areas within the CPOW project area. Twenty-eight percent of Craig's deer came from the Project Area WAA's between 1987 and 1990. Analysis shows that there is an adequate number of deer to meet the current subsistence and sporthunting demand for deer now and through the year 2040 (Alternative P TLMP SDEIS).

Hollis Areas within the project area used by Hollis residents include areas adjacent to the road system for deer hunting, and Staney Creek, Hatchery Creek, Logjam Creek, and Thorne River for fishing. Fifty-one percent of Hollis's deer came from the Project Area WAA's between 1987 and 1990. Analysis shows that there is an adequate number of deer to meet the current subsistence demand for deer now and through the year 2040, (Alternative P TLMP SDEIS); however, at some point in the future it may be necessary to restrict the sport harvest of deer and give the rural communities preference.

Hydaburg Hydaburg subsistence use within the Project Area is dispersed throughout the Project Area, according to TRUCS maps. Forty percent of Hydaburg's deer came from the Project Area WAA's between 1987 and 1990. Analysis shows that there is an adequate

number of deer to meet the current subsistence and sporthunting demand for deer now and through the year 2040, (Alternative P TLMP SDEIS).

Kasaan Areas used for subsistence purposes include Karta River for harvest of fish, particularly sockeye salmon; Salt Chuck for waterfowl and bear; and parts of Kasaan Peninsula for deer hunting. Sixty percent of Kasaan's deer came from the Project Area WAA's between 1987 and 1990. Analysis shows that there is an adequate number of deer to meet the current subsistence and sporthunting demand for deer now and through the year 2040, (Alternative P TLMP SDEIS).

Klawock Subsistence harvest methods within the community of Klawock have been changing since the road tie with Hollis was made in 1984. Prior to that time subsistence harvest was mostly tied to boating activities. Since road access to the rest of the island has been available to the residents of Klawock, there has been a shift from using boats to harvest subsistence materials, to using trucks and cars. Deer harvest takes places on the islands of Noyes, Lulu, San Fernando, San Juan Bautista, Suemez, Heceta, and St. Phillips. In the project area, deer harvest occurs along the entire road system (but primarily in the Staney Creek, Logjam Creek and Thorne River areas), and beach fringe areas. Duck and goose harvest occurs in Big Salt Lake. Thirty-two percent of Klawock's deer came from the Project Area WAA's between 1987 and 1990. Analysis shows that there is an adequate number of deer to meet the current subsistence demand for deer now and through the year 2040, (Alternative P TLMP SDEIS); however, at some point in the future it may be necessary to restrict the sport harvest of deer and give the rural communities preference.

Petersburg Residents of Petersburg reported in the TRUCS survey that they used the entire area from Big Salt Lake east to Thorne Bay, north to the Sarkar Lake/Coffman Cove area for deer hunting.

Port Protection/Point Baker While the most important subsistence use areas for Port Protection and Point Baker (North end of Kosciuski and Prince of Wales islands) are outside of the Project Area, several areas within the Project Area are also important hunting and fishing locations for the two communities, including Whale Pass, Deweyville/Sarkar Lake, Stevenson Island, and Ratz Harbor.

Thorne Bay The extensive road system adjacent to the community provides numerous opportunities for residents to gather firewood, trees to saw into lumber for homebuilding, and access to hunting and fishing areas throughout the Project Area. Some trapping also occurs along the road system and beach fringe areas. Eighty-seven percent of Thorne Bay's deer came from the Project Area WAA's between 1987 and 1990. Analysis shows that there is an adequate number of deer to meet the current subsistence demand for deer now and through the year 2040 (Alternative P TLMP SDEIS); however, at some point in the future it may be necessary to restrict the sport harvest of deer in order to give rural communities priority.

Whale Pass The extensive road system adjacent to the community provides access to hunting and fishing areas throughout the Project Area. In addition to areas adjacent to the road system, the Naukati/Staney Creek area is used for deer hunting and fishing. Seventy-one percent of Whale Pass's deer came from the Project Area WAA's between 1987 and 1990. Analysis shows that there is an adequate number of deer to meet the current subsistence and sporthunting demand for deer now and through the year 2040 (Alternative P TLMP SDEIS).

Wrangell Residents of Wrangell used areas adjacent to the major road system and beach fringe within the Project Area for deer hunting, according to the TRUCS survey. Twenty percent of Wrangell's deer came from the Project Area between 1987 and 1990. Analysis shows that there is adequate deer available to meet the current level of harvest for subsistence and nonsubsistence use through the year 2040.

As a result of several considerations, including the availability of subsistence resources in undisturbed areas of Prince of Wales Island, including LUD I and LUD II areas within or adjacent to the Project Area (such as the Sarkar and Karta drainages), the relative independence of most communities from subsistence resources in the Project Area, as well as analysis contained in the Tongass Land Management Plan SDEIS, the Forest Service determined to schedule an environmental analysis of the Central Prince Wales Project Area ahead of other Project Area analyses. Subsequent Projects including Lab Bay, Polk Inlet, North Revilla, Port Stewart, Vixen Inlet, Upper Carrol, Ratz Harbor, Heceta Island, Control Lake, Three Creeks, and Sea Level will undergo environmental analysis within the next 3 to 5 years.

Extensive forestwide cumulative effect analysis has been included in the TLMP SDEIS (TLMP SDEIS pages 3-628 through 3-765). That analysis, and the tables of data shown in appendix K of TLMP SDEIS are incorporated by reference into this document. The data in appendix K and L indicates subsistence hunting of deer and other uses in virtually every area of the Tongass with substantial quantities of harvestable timber. The following information is extracted directly out of the Tongass Land Management Plan Revision, Supplement to the Draft Environmental Impact Statement, pages 3-762 and 3-763:

> In conducting the subsistence evaluation it is determined that, in combination with other past present and reasonably foreseeable future actions, none of the alternatives would pose a significant possibility of significant restriction for salmon, other finfish, marine mammals, invertebrates, plants, mountain goat, moose, waterfowl, sea birds, or other small game. Together these resources account for an average of 79 percent of the total harvest of subsistence resources (Kruse and Muth, 1990).
>
> In considering the impacts of future actions that may take place under the proposed alternatives on deer, two types of analysis was conducted. Potential effects were first determined for those WAAs where residents have successfully harvested deer, then for those WAAs where residents have ever gone to harvest deer. Both 10 percent and 20 percent harvest levels of the deer population were used.
>
> Considering only those WAAs where residents successfully harvested deer and assuming a harvest level of 10 percent of the population, there would be sufficient deer in all alternatives for the next 50 years to meet all subsistence needs for all communities except Gustavus, Hoonah, Kake, Pelican, Sitka, and Yakutat (appendix K). For these communities, there would be insufficient habitat capability to support harvest by all subsistence users (regardless of the community of orgin). However, at 20 percent of the population, all subsistence needs for these communities would be met by all alternatives for the next 50 years (appendix K).
>
> If instead of considering only those WAAs in which hunters were successful, we consider all WAAs ever hunted by community residents, then there would be sufficient deer habitat capability to support all subsistence hunters in the WAAs used for hunting by all subsistence communities except for Pelican and Gustavus. If instead of assuming a 10 percent harvest level, a 20 percent harvest level is used, there would be sufficient habitat capability to support all subsistence harvest in all WAAs used for hunting by all subsistence communities.

> As a result of the analysis of the impacts of projects that would be permissible under each of the alternatives considered for adoption in the Forest Plan, it has been determined that all of the alternatives, if all permissible projects were fully implemented, have the potential to impact subsistence uses of deer, brown bear, and furbearers (specifically martens) due to potential effects of projects on abundance/distribution, and competition.

The analysis shown in chapter 3 of this Project EIS is supported by the analysis shown above in the TLMP SDEIS. The conclusion stated above, "it has been determined that all of the alternatives, if all of the permissible projects were fully implemented, have the potential to impact subsistence uses of deer. . .", supports the conclusion that any environmental analysis area within the Tongass would have a similar chance of having a significant possibility of a significant restriction on subsistence resources for Sitka Black-tailed deer, and other mammals.

The analysis for ANILCA section 810 are shown in the Subsistence section of chapter 4, in this EIS. The determinations made from the ANILCA section 810 analysis and findings are a part of the Record of Decision for this project and were developed in conjunction with the Final EIS.

Forest Plan Implementation

Review of Available Volume

A review was conducted of each VCU within the designated sale area for available volume. This analysis was based on computer inventories and Allowable Sale Quantity (ASQ) calculations from TLMP Draft Revision (1991a).

The review used the following guidelines to identify likely areas to schedule for environmental analysis in the near future:

(1) Evaluate by area the total available volume within the designated sale area. Between 1991 and 1993, there is a need to identify a potential harvest of 700 MMBF.

(2) Identify a tentative operating schedule which addresses volume to be offered from the Ketchikan Area.

(3) Prepare a schedule of environmental analysis areas which shows how the Ketchikan Area will meet the tentative operating schedule from 1991 through the end of the contract. This schedule must provide a minimum of 615 MMBF 'current timber supply' through the end of the contract.

The results of the first step by the working group analysis are presented in table 5. The results of this volume review, further supported by TLMP revision information, provided the basis for scheduling the next series of environmental analyses.

Table 5
Available Volume By VCU In The KPC Contract Boundary (9/89).

Project Area	MAs in Analysis Area	(MMBF)
AA I Cental Prince of Wales		
Central Prince of Wales	K03 (Portion), K07, K08, K09, K10	291
Ratz (2nd Entry)	K09 (Portion)	40
Honker (2nd Entry)	K08 (Portion)	141
Luck Lake (2nd Entry)	K08 (Portion), K09 (Portion)	70
Tuxekan (2nd Entry)	K07	105
AA 2 - Lab Bay		
Lab Bay	K01, K03 (Portion)	85
North POW (2nd Entry)	K01, K03 (Portion)	150
AA 3 - Polk Inlet		
Polk Inlet	K17, K18	125
Chomondeley (2nd Entry)	K18, K19	80
AA 4 - North Revilla		
North Revilla	K32 (Portion)	200
AA 6 - Sea Level		
Sea Level	K35	67
AA 7 - Control Lake		
Control Lake	K05, K08	187
AA 8 - Upper Carrol		
Upper Carrol	K32 (Portion)	130
AA 9 - Three Creeks		
Three Creeks	K39	49
AA 10 - Vixen Inlet		
Vixen Inlet	K29	175
AA 11 - Port Stewart		
Port Stewart	K30	135
AA 12 - Lower Carrol		
Lower Carrol	K34, K35	41
AA 13 - Kosciusko		
Kosciusko	K05	36
AA 14 - South POW		
South Pow	K28	80
AA 15 - Heceta		
Heceta	K11	76
AA 16 - Chasina		
Chasina	K24	164
AA 17 - Moira		
Moira	K25	17

Analysis Area Reviews

For each area identified as having sufficient volume available to consider for further environmental analysis at this time, a review was conducted to decide which areas to schedule first, considering the current TLMP and proposed revised TLMP schedule, and other factors described below. The results of this review and supporting reasons for each area appear below:

Central Prince of Wales - This project area is located within TLMP management areas K03, K07, K08, K09 and K10. The area has had extensive harvesting in the past. No additional log transfer facilities (LTF's) are required to harvest timber in this area. The majority of the road system is already in place, only limited additional road construction would be required. The area is entirely within the primary sale area. This area was give the highest priority due to it's location within primary sale area, ease of access, prior harvest and no additional LTF construction.

Polk Inlet - This project area is located within TLMP management area K17 and K18. The K17 portion of the area is located within the primary sale area. The area has had extensive harvesting in the past. Roads have been developed previously into the area but construction is difficult due to the terrain. A logging system transportation analysis was completed for the area as part of the 1989-1994 EIS. Three LTF's will be required enter the area but they have already been approved for construction under the 1989-1994 EIS and their required permits have been acquired or in process. The area was given a high priority since it has a large portion located within primary sale area, has had previous harvest, and has had prior road development. The area was not given highest priority due to LTF construction and difficult access.

North Revilla - This project area is located within TLMP management area K32. The area has had extensive harvesting in the past. It is located within the primary sale. A large amount of new road construction will be needed in the area. Road construction into the area is difficult due to steep terrian and unstable slopes. Nine LTFs will be required to access the area, of which three will require new construction. The area was given high priority since it is located within the primary sale area, has had prior harvest and road construction, and a logging system transportation analysis had already been completed for the area. It was not given highest priority due the requirement of three new LTFs and difficult road construction.

LAB Bay - This project area is located within TLMP management area K01 and K03. The area has had extensive harvesting in the past. One additional LTF will be required, other timber will utilize two existing LTF's. The vast majority of timber will have to pass through these two existing LTFs. The limited number of additional LTF's in the area could create a bottle neck getting wood from the field into the water. The area was given a high priority since it is in the primary sale area, has current road access, and has had previous harvest. It was not given highest priority due to a limited number of LTF's to put logs into the water.

Sea Level - This project area is located within TLMP management area K35. The area has had limited harvesting in the past. The area is within the KPC long term contract, however it is outside primary sale area boundary. Road construction is difficult in the area but no new LTF's are required to access the timber. This area was given a moderate priority for scheduling due to being within the timber sale contract and not requiring any new LTF's.

Control Lake - This project area is located within TLMP management area K08 and K05. The area has had extensive harvesting in the past. No additional log transfer facilities (LTF's) are required in to harvest timber in this area. The majority of the road system is already in place, only limited additional road construction would be required. The area is within the long-term contract area, but not within the primary sale area portion. This area was given a moderate priority since it had ease of access, prior harvest and no additional LTF construction but was not within the primary sale area.

Heceta - This project area is located within TLMP management area K11. The area has had extensive harvesting in the past. The area is within the KPC long term contract, however

it is outside primary sale area boundary. Remaining volume available for harvest in the area is low. The project areas is a small island off the west coast of Prince of Wales Island and faces the open ocean. This makes the logistics associated with timber harvest activities difficult. This area was given a moderate priority for scheduling due not being in the primary sale are, low potential volume, and difficult logistic problems.

Upper Carrol - This project area is located within TLMP management area K32. The area has had limited harvesting in the past. The area is within the KPC long term contract, however it is outside primary sale area boundary. Road access in the area is difficult. One new LTF will be required. Road construction associated with this project may help complete the linkage for the transportation utility corridor planned for the area. This area was given a moderate priority for scheduling despite the potential transportation utility corridor due difficult access and not being in the primary sale area.

Three Creeks - This project area is located within TLMP management area K39. The area has had limited harvesting in the past. The area is immediately behind the community of Ketchikan and as is heavily used for recreation. The area is within the KPC long term contract, however it is outside primary sale area boundary. This area was given a moderate priority for scheduling despite good timber harvest economics due to low potential volume and high recreation values.

Vixen Inlet - This project area is located within TLMP management area K29. The area has had limited harvesting in the past. There is potentially a large amount of volume available in the area, although it is somewhat scattered. This will require a high ratio of miles of road construction per MBF of timber harvest. The area is within the KPC long term contract, however it is outside primary sale area boundary. The project is on Cleveland Peninsula which has important wildlife and recreation values. There is currently no road access into the area. There are no existing LTF's and one new LTF would be required. This area was given a moderate priority for scheduling due the large amount of potential volume and since it is within the long term sale boundary. It was not given a high priority since it is not within the primary sale area and has high recreation and wildlife values.

Port Stewart - This project area is located within TLMP management area K30. The area has had limited harvesting in the past. There is potentially a large amount of volume available in the area, although it is somewhat scattered. This will require a high ratio of miles of road construction per MBF of timber harvest. The area is within the KPC long term contract, however it is outside primary sale area boundary. The project is on Cleveland Peninsula which has important wildlife and recreation values. There is currently no road access into the area. There are no existing LTF's and one new LTF would be required. This area was given a moderate priority for scheduling due the large amount of potential volume and since it is within the long term sale boundary. It was not given a high priority since it is not within the primary sale area and has high recreation and wildlife values.

Lower Carrol - This project area is located within TLMP management area K34 and K35. The area has had limited harvesting in the past. The area is within the KPC long term contract, however it is outside primary sale area boundary. The area was recently analyzed as part of the Shelter Cove EIS. As part of that EIS a logging system transportation analysis was developed for the area. Remaining volume potentially available for harvest from this area is low. This area was given a low priority for scheduling due to not being in the primary sale area, low amount of potential volume, and having been recently analyzed as part of another EIS.

Kosciusko - This project area is located within TLMP management area K05. The area has had extensive harvesting in the past. The area is within the KPC long term contract,

however only a small portion is within the primary sale area boundary. This area was recently analyzed as part of the Sea Otter Sound project. As part of the settlement agreement on that EIS, the area is currently not available for harvest as part of the long-term sale. This area was given a low priority for scheduling due to not being included in the primary sale area and since it was recently analyzed in an EIS.

South POW - This project area is located within TLMP management area K28. The area has had extensive harvesting in the past. The area is within the KPC long term contract, however it is outside primary sale area boundary. There is no existing logging system transportation analysis available for the area. The area would require the construction of three new LTF's. Road construction in the area would be very difficult. The quality and quantity of timber in the area is not very high. The result is that timber harvest in the area is likely to be economically marginal. As a result of these factors, this area was given a low priority for scheduling.

Results of Analysis

Upon completion of the above analysis, four Project Areas were identified and scheduled for environmental analysis. The four timber projects were initiated which had a high priority and were within the KPC "Primary Sale Area". The KPC contract provides direction to seek to find timber supplies within the Primary Sale Area before seeking volume within contingency areas. These four projects were needed to produce sufficient volume to provide KPC with 205 MMBF for the 1993 logging season, as well as to provide a three-year timber supply of 615 MMBF. There is expected to be 120 MMBF of timber volume remaining from previous projects which will be available to KPC by the beginning of the 1993 operating season. Therefore, these four timber projects need to produce a total of 700 MMBF, which, when combined with the 120 MMBF currently available, will provide volume for the 1993 logging season, plus a three-year timber supply.

This 700 MMBF was divided among the four timber projects based on the size of the project areas, as well as on their relative abilities to produce timber volume in an expedient fashion. Other factors considered in making this volume determination for the different projects included: (1) consistency with the sale schedule in the TLMP (1979a, as amended); (2) volume determined to be available in the project areas; (3) amount of road network in place; (4) the number and location of Log Transfer Facilities (LTF's) and their relative ability to handle this volume of timber within a three-year time frame; (5) presence of existing KPC-operated logging camps within the project areas to handle this volume; and (6) consistency with the sale schedule in TLMP Draft Revision (1991a).

Subsequently, a schedule of additional project level environmental analysis was identified for fiscal years 1993 through 2000 to complete the Long-term Sale.. This schedule has been reviewed and reaffirmed and is shown in the following memo.

United States Department of Agriculture
Forest Service
Region 10
Tongass National Forest
Ketchikan Area
Federal Building
Ketchikan, AK 99901

Reply To: 1950

Date: Sept. 10, 1992

Subject: Timber Sale NEPA Documents

To: Forest Supervisor

The following schedule of NEPA documents represents the proposed NEPA analysis needed to fullfill the timber sale action plan. This memo is intended to update the July 7, 1992 sale schedule memo.

KETCHIKAN AREA DRAFT SALE SCHEDULE
NEPA DOCUMENT SUMMARY

Year Complete	EIS Name	Management Area	MMBF
1993	Central Prince of Wales	K03, K07, K08, K09, K10	290
1993	Lab Bay	K01, K03	85
1993	Polk Inlet	K17, K18	125
1993	North Revilla	K32	200
1994	Sea Level	K35	67
1995	Control Lake	K05, K08	187
1995	Heceta	K11	76
1996	Upper Carrol	K32	130
1996	Three Creeks	K39	49
1996	Vixen Inlet	K29	175
1996	Port Stewart	K30	135
1998	Lower Carrol	K34, K35	41
1998	Chasina	K24	164
1998	North POW	K01, K03	150
1999	Chomondeley	K18, K19	80
1999	Ratz	K09	40
1999	Honker	K08	141
1999	Luck Lake	K08 ,K09	70
1999	Tuxekan	K07	105
1999	Moira	K25	17
2000	South Pow	K28	80

DAVID ARRASMITH
IDT PLANNING STAFF OFFICER

APPENDIX B: BIOLOGICAL ASSESSMENT

This appendix was not available at the time of publication. Informal consultation is currently underway with the U.S. Fish and Wildlife Service regarding the Biological Assessment. The completed Biological Assessment will be incorporated into the Final CPOW Environmental Impact Statement. The environmental consequences on threatened and endangered species and on category 2 candidate species are presented in Chapter 3 of this Draft EIS. Upon its completion, copies of the Biological Assessment will be available upon request.

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APPENDIX C
Unit Design Criteria

The CPOW IDT designed a multi-entry layout plan (MELP) to identify all potential timber harvest units and associated roads within the CPOW Project Area. Units were designed to meet the standards and guidelines of the Forest Plan and be consistent with the standards adopted by the TLMP revision. These units were directly linked to the same GIS information utilized in the TLMP Revision analysis. Each unit was photo identified, mapped on large scale topographic maps, and passed through an interdisciplinary review. During the FY92 field season, units proposed for harvest by the various alternatives will be field reconned.

The inventory process started in November 1990. An IDT was convened with the following personnel:

IDT leader/timber planner
soil scientist/hydrologist
landscape architect/recreation planner
wildlife/fisheries biologist
systems analyst

The initial premise behind the development of the inventory was to identify low risk, non-controversial harvest units which could provide timber volume for a large scale EIS on Prince of Wales Island for the Long-Term Contract. As the Project Area became more tightly defined through the preliminary NEPA process, it became necessary to expand the scope of the inventory to include all tentatively suitable commercial forest land. This more expansive inventory analyzed harvest units in areas which, because of their resource concern and potential for public controversy, were not considered in the initial inventory process.

The general methodology used in the inventory process was to delineate areas which were not suitable for timber entry, then identify commercial forest land within the potentially loggable areas, and finally define individual, discrete harvest units which fully met the governing standards and guidelines.

<u>Legally withdrawn</u>

1. Private land
2. LUD I/Primitive recreation areas
3. Class I/II stream buffers (for simplicity, this has been expanded to include all Class II streams and not just those flowing into Class I streams)
4. Eagle nest buffers

5. Proposed harvest units for the long term sale or for independent offerings

<u>Physically withdrawn</u>

1. Non-timbered land
2. Lakes
3. Forested land, but less than volume class 4 as determined by the GIS TIMTYP layer
4. Second growth

<u>Withdrawn by TLMP standards and guidelines</u>

1. Shoreline buffer of 500 feet
2. 100-foot buffer around all freshwater lakes over 10 acres
3. Soil types identified as rock out croppings (SMU = 81), talus slopes (SMU = 22), and landslides (SMU = 15)
4. Encumbered lands (selected but not conveyed)
5. 1,000-foot buffer around estuaries

The initial phase of the inventory was the compilation of all the GIS data for areas withdrawn from harvest consideration. The reverse image of these deferred areas was then overlaid with the GIS TIMTYP layer to delineate commercial forest land which was suitable for harvest. This timber data was then combined with the roads and streams layer and plotted on a scale of one inch equals one thousand feet. These maps were overlayed with high-quality, topographic maps of a similar scale.

The timber planner started the second phase of the process by delineating the harvest units and associated roads, designating the logging system requirements, and assigning a unit number. Proposed units were transferred to aerial photos---a process which was facilitated because the photos also have a rough scale of one inch equals one thousand feet. When the 1991 aerial photos became available, the CPOW IDT switched to four inch to the mile topographic quads, because that was the scale of the new aerial photos.

During the logging/road design, roads were conservatively planned to improve the potential of getting the surveyed road fairly close to the planned location. Sustained grades were limited to less than 8 percent, except for short pitches that occasionally touched 20 percent. The logging system design used the following assumptions:

	Maximum uphill distance	Maximum downhill distance
Highlead	1,200 feet	600 feet
Small skyline	1,500	800
Large skyline	2,000	1,000
Helicopter	5,000 feet	

After the initial unit delineation by the timber planner, other resource specialists reviewed the proposed units independently (multidisciplinary) and then participated in an interdisciplinary review to determine the status of the unit. The IDT assigned ratings to each unit, based on individual and collective review. These ratings were intended to be used to help select units during NEPA alternative formulation, as well as to pass information from the planning team to field reconaissance personnel. These rating, or "status codes" include:

- unit appears OK
- unstable, oversteepened slopes which apparently don't meet TLMP standards and guidelines
- requires fisheries review for anadromous streams
- requires on-ground logging system review
- requires on-ground road location review
- unit deleted; does not meet standards and guidelines
- poor potential for regeneration
- low volume; potentially non-commercial
- potential for caves
- located within identified goshawk management area
- located within Thorne/Hatchery Scenic/Recreation River corridor
- located within Sarkar Wild & Scenic River corridor
- does not meet NFMA dispersion requirement (greenup) at this time
- high hazard soils; review required
- high hazard soils; review recommended
- McGilvery soils present; potentially > 40%
- McGilvery soils present but likely < 40%
- potentially suitable for shovel logging
- unit partially logged; need new unit design.

The units and roads were then digitized back into the GIS database, incorporated with other site specific data, and transferred to another database management system for subsequent analysis, including proportionality determinations, wildlife modeling, etc.

The units developed from this inventory or MELP were used to define timber harvest units for alternatives considered under the CPOW EIS. In terms of

site specificity, all units were reviewed by a multi-resource team using topographic maps and new aerial photos taken in 1991. The IDT spent approximately 10 field days during 1991 reviewing these units on the ground. In addition, another 30 or so units were reconned by Thorne Bay District personnel during the winter of 1991-92. In Spring 1992, Forest Engineering and Thorne Bay District layout personnel reviewed the units extensively using 1991 aerial photos, topo maps, and personal knowledge of the ground and made numerous suggestions and improvements to the proposed harvest units.

The major field recon effort was initiated in July 1992 by field teams composed of Forest engineers and Thorne Bay layout and resource specialists. The purpose of the recon was to determine the feasibility of accessing and harvesting the unit according to the planned systems and to identify portions of the proposed unit which potentially could not be harvested within Forest Plan guidelines. This information on the proposed units will be fed back to the planning teams to more precisely refine the units being proposed for timber harvest. Because the recon will not be completed until after the Draft EIS is published, this information will be incorporated into the Final EIS.

ACRONYMS AND SYMBOLS

ADF&G	Alaska Department of Fish and Game
AHMU	Aquatic Habitat Management Unit
ANCSA	Alaska Native Claims Settlement Act
ANILCA	Alaska National Interest Lands Conservation Act
ASQ	Allowable Sale Quantity
BBF	One billion board feet
BLM	Bureau of Land Management
BMP	Best Management Practice
CFL	Commercial Forest Land
CFR	Code of Federal Regulations
CPOW	Central Prince of Wales
CZMA	Coastal Zone Management Act of 1976
DBH	Diameter at Breast Height
DEIS	Draft Environmental Impact Statement
EIS	Environmental Impact Statement
EPA	Environmental Protection Agency
EVC	Existing/Expected Visual Condition
FEIS	Final Environmental Impact Statement
FSH	Forest Service Handbook
FSM	Forest Service Manual
GIS	Geographic Information System
GMU	Game Management Unit
IDT	Interdisciplinary Team
KPC	Ketchikan Pulp Company
KV	Knutsen-Vandenberg Act
LTF	Log Transfer Facility
LUD	Land Use Designation
LWD	Large Woody Debris (same as LOD)
MA	Management Area
MBF	One thousand board feet
MELP	Multi-Entry Layout Process
MIS	Management Indicator Species
MM	Maximum Modification
MMBF	One million board feet
NEPA	National Environmental Policy Act
NFMA	National Forest Management Act
NMFS	National Marine Fisheries Service
NOI	Notice of Intent
PR	Partial retention
R	Retention
RM	Roaded modified
RN	Roaded natural
ROD	Record of decision
ROS	Recreation Opportunity Spectrum
SHPO	State Historic Preservation Officer
SPM	Semi-primitive motorized
SPNM	Semi-primitive nonmotorized
TLMP	Tongass Land Management Plan
TRUCS	Tongass Resource Use Cooperative Survey
TTRA	Tongass Timber Reform Act
USDA	United States Department of Agriculture
USDI	United States Department of the Interior
USFWS	United States Fish and Wildlife Service
VCU	Value Comparison Unit
VQO	Visual Quality Objective
WAA	Wildlife Analysis Area
>	Greater than
<	Less than

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